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Heat-Treating

at Brown & Sharpe's

By Ellsworth Sheldon
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Department divided in two sections—One section handles high-speed steel exclusively—Dual heating units provided—Automatically controlled electric furnaces draw high-speed steels

THE heat-treating department of the Brown & Sharpe Manufacturing Co. is housed in a single-story building, the windows of which are heavily shuttered with louvres to exclude direct sunlight without interfering with the free circulation of air, and its furnaces, fires and quenching tanks are covered by hoods that are connected with an ample exhaust system to keep the atmosphere within the building clear and uncontaminated. Because of the variety of work handled therein, the department is equipped with many kinds of heating apparatus, ranging from coal- and coke-fired furnaces to the latest contribution to the art of heat-treating in the shape of automatically controlled electric furnaces. Between these extremes are gas- and oil-fired furnaces of various types; pots of molten lead, heated by gas and by oil fires; baths of chemical salts in which the higher temperatures necessary to the treatment of high-speed steels are obtained; electric furnaces in which the temperature is under manual control; rotary carburizers, fired by gas or oil; electrically heated oil baths for tempering carbon steels; open fires, and portable gas flames.

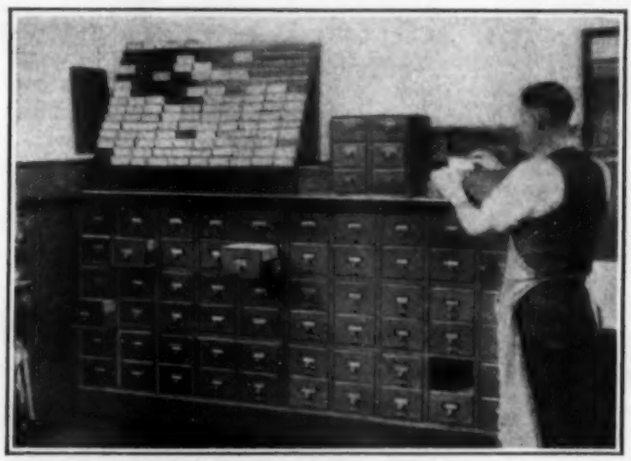


Fig. 1—Indexed card file in the department office

Each piece of equipment is employed upon the class of work to which it has been proved by experience to be best adapted. For annealing, carbonizing and other processes requiring sustained heats, it is difficult to better the efficiency of the coal- and coke-fired furnaces. For the extremely high temperatures to which high-speed steel must be subjected, the two-stage oil-fired furnaces are well adapted to such pieces as may be heated in open flame without detriment, while the molten chemical salts are chosen to heat parts, the shape and nature of which are such that some portion of the tool might become overheated in an open flame before the remainder reached the required temperature. For each heating unit, except the annealing and carbonizing furnaces, there is a quenching bath of oil or water—often both—the temperatures of which are under close control. The quenching water used in most of the tanks is a saline solution in which calcium-chloride, instead of sodium-chloride, is the salinating medium. Water is supplied to the individual tanks from a central reservoir, located underground, in which there is a constantly running motor-driven pump to keep the solution always in motion. A system of piping conducts the solution to the various tanks and returns it through a cooling chamber wherein are coils of pipe in which cold water from an artesian well is constantly flowing. The flow through the coils is controllable, so that the temperature of the quenching solution may be maintained at approximately 60 deg. F. at all seasons of the year. From the cooling chamber the solution returns to the reservoir.

Wherever oil is used as a quenching medium for other than high-speed steel, either a plain metal container is set into the water tank, or a special water-jacketed tank is provided, through which the water may circulate. Oil in which high-speed steel is quenched is

The first article. The second will appear in an early issue.

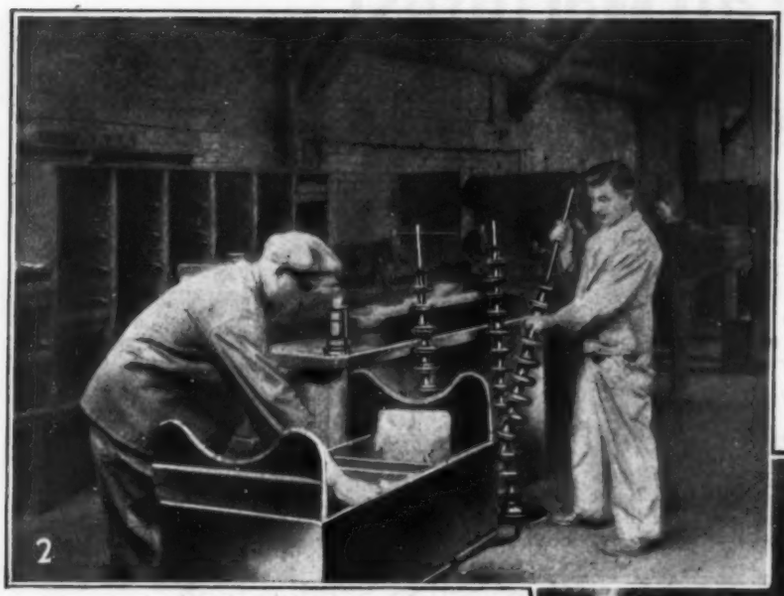


Fig. 2—Where work to be heat-treated is received

Fig. 3—One of the dual heating-units used in the treatment of high-speed steel. One furnace is maintained at a temperature of 1,500 deg. F., while the heat in the other one is much higher

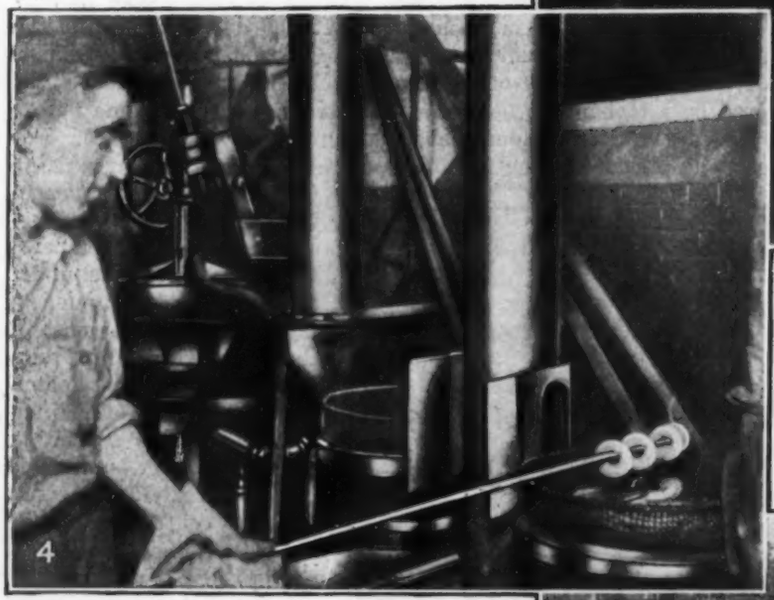


Fig. 4—Some parts, made of high-speed steel, are air hardened. They are placed in a wire basket on a slowly-revolving table. Two pipes with lateral openings deliver air against the parts as the table revolves

Fig. 5—Automatically-controlled electric furnaces

not cooled, since cold oil would not be desirable for the purpose.

Records are kept of all work passing through the department, so that in event of question arising as to the treatment to be received by any part, a reference to the files will furnish the required information. The records are especially valuable in cases where a certain kind of part or a particular kind of steel is handled only at comparatively long intervals. The card representing the previous lot can be depended upon to supply not only the data regarding the treatment, but any special information as to the behavior of the parts in service, as written into the record from reports of other departments. The file in which the card records are kept is shown in Fig. 1, each job is represented by an indexed—and in many cases by a cross-indexed—card, so that full information concerning each item is immediately available. The rack above the card file shows service tickets representing work in progress through the department.

Fig. 6—Container, made of heat-resistant alloy

All work coming into the department is delivered to a receiving clerk whose duty it is to sort the various jobs with reference to the treatment each is to receive, to arrange the parts in a manner convenient for handling them, and to despatch them to their several locations. He receipts for each job to the department from whence it came, and makes out tickets carrying all data and any special information that may be desirable, in which work he is guided largely by the records of the card file.

The tickets are made in duplicate, one remaining with the job in its progress so that the various men through whose hands the latter is to pass may make their notations as to times, temperatures, etc., and the other going at once to the office of the department foreman, whose assistants are thus informed as to what jobs are in process, and are in position to follow up any particular one as may be necessary. The work ticket returns to the office when the job is checked out, and becomes the basis from which the permanent records are compiled. Fig. 2 shows the receiving clerk's quarters.

As would be expected in a plant the product of which is of a so diversified nature, there is a wide variety of materials to be treated and at least an equal difference in the nature of the treatment to which each must be subjected. Though it would be difficult indeed to provide complete equipment for every variety, the several processes are segregated in so far as it is practicable to accomplish it.

Thus, the heat-treating department is divided into two main sections, with the tempering room, inspection benches and department offices between them. One section handles high-speed steels exclusively and is equipped with dual heating units, consisting of pre-heat and high-heat furnaces, fired with oil, and with electric furnaces for tempering. Adjoining this room are the sand-blasting machines to clean the product after it has been through the process.

In Fig. 3 is shown one of the dual heating units of the high-speed steel room. The furnace nearest the observer appears to be dark, but it is so only by comparison, since its temperature is maintained at 1,500 deg. F., while its neighbor is registering a much higher heat.

In another room is an installation for heat-treating with molten salts. A gas-fired furnace contains three crucibles, or pots, which are maintained at definite temperatures for the different stages of the process. The work is preheated in the first pot until it acquires the temperature of the salt, which is held at 1,400 degrees. It is then transferred to the middle pot and there raised to the hardening heat. The next step is to quench it at 1,100 deg. in the molten salts of the third pot.

Though many different parts are treated in the high-speed steel room, the bulk of the work is milling cutters, ranging from small profiling cutters and thin saws to large, heavy, single-piece formed cutters. Just which processes of treating, which temperatures and durations of heat, etc., are utilized depends upon the analysis of the steel, the characteristics of the piece, and the requirements the finished work is expected to meet.

The open fires of the dual heating units produce the greatest degree of hardness and are suitable for the majority of the work, even to most of the intricate formed-cutters where the preservation of the contour is as essential as the proper degree of hardness. When, however, this preservation of contour becomes the prime requisite, as is the case when cutters are to be held to very close requirements on lantern projection, the work is heated and quenched in the molten salts.

Automatic temperature-recording instruments for the dual heating units are located at the side of the room, and an automatic system of colored lights keeps the operator and the foreman informed when the heat of the respective units varies even slightly from the definite temperatures set for the work being done. A white light indicates correct temperature. A red light informs the operator that the temperature has gone above, and a blue one that it has fallen below the set

Fig. 7—Loading the container

limit. In either case the burners must be adjusted immediately to correct the variation.

Some high-speed steel parts are air-hardened, and the device shown in Fig. 4 is provided to cool them. Two vertical blast pipes, with lateral openings, stand on opposite sides of a slowly-revolving circular table on which a wire basket is placed. The heated parts are withdrawn from the furnace with a hook-rod and are held between the opposed air blasts until the color has disappeared, when they are deposited in the basket to cool to room temperature.

Cutters that are heated in the open-flame, high-speed furnaces and quenched in oil, are afterwards drawn to 1,100 deg. in automatically-controlled electric furnaces. In Fig. 5 may be seen two of the furnaces, with their control and recording panels in the background. These furnaces are not only under full automatic control from the moment the current is first turned on until the main switch is opened at the expiration of the set time limit, but a continuous and permanent record is made upon a time chart.

One of the principal objections to the electric furnace—that it may not be depended upon to maintain a uniform temperature at all parts of the heating chamber—has been overcome in this installation. Within the chamber of each furnace there is a propeller fan mounted upon the upper end of a vertical shaft that extends through the bottom of the furnace and is driven by a motor below it.

This fan runs continuously, first in one direction for sixty seconds, then reversing and running in the opposite direction for a similar period. This reversal of the fan at one minute intervals is maintained

Fig. 8—The sand-blasting machines

throughout the heat, with the result that the atmosphere of the furnace—of whatever it may be composed—is circulated constantly about the charge and over the thermo-couple that is transmitting its infinitesimal impulses to the registering and recording mechanisms on the panel, thus insuring that every part of the work is being subjected at all times to the same degree of heat registered by the instrument.

The work is placed in a container made of a heat-resistant alloy, the container is deposited in the heating chamber of the furnace and the counterweighted cover is closed. The depth of the chamber accommodates the container without interfering with the fan, and the wire-meshed bottom of the container permits a free circulation. The container is shown in Figs. 6 and 7, the latter view showing the method of loading it.

In a room adjoining the furnace room are the sand-blasting machines, some of which may been seen in Fig 8, to clean the parts and remove the discoloration incident to the heat-treatment. Clean, sharp Berkshire sand is blown by steam jets at high velocity upon the work, which is manipulated under the jets by hand; a method that has been found most satisfactory for this class of work.

Individuals Solve Own Problems in Development

THAT schools and colleges have given training in only about 15 per cent of the essentials of a job is the conclusion of N. L. Hoopingarner, professor of business psychology in the School of Commerce of New York University, based on investigations in the field, involving 50,000 individuals, during the last seven years.

Business has come to realize that the greatest part of its problem is to develop the effective use of the knowledge of the individual, that is to develop personal qualities. "The employer told the new man: 'Here are the facts and methods; now it is up to you to make good.' The reason for this attitude was that the employer really did not know how to help the man make good."

A man's worth above thirty or forty dollars a week, regardless of his education, is dependent on his ability to deal with people.

The factors in ability, or personality, are subdivided into certain traits for purposes of analysis. Investigations prove such a glaring gap between training and performance on the job that colleges are realizing that their greatest responsibility lies in training the student in the use of his knowledge after he gets out into life.

Even in engineering a man's success is due approximately 15 per cent to his technical knowledge and 85 per cent to human qualities. These facts are confirmed by surveys made in conjunction with Carnegie Institute of Technology.

Results show that advisory methods are not adequate, but, in the belief that the problem could be simplified by intense work under supervision, four years ago a course in business psychology was begun to help the student in "organizing himself." For the purpose of vocational guidance the student analyzes his own abilities and plans to develop himself so as to be assured the greatest possible chance of success.

Breakdown jobs give the all-around man a chance to exercise his ingenuity and are interesting even though they involve hard work and long hours at times. But the all-around man who tires of repetitive work can always find places where his services are in demand, even if he has to go far afield to find them.

Experiments by Dr. Ing. Otto Heinz Lehmann indicate that cast iron with a high pearlite content is most resistant to wear. Brinnell hardness seems to have no effect on the degree of vear. These deductions are of special interest to makers of motor cylinders and all machines using cast iron for guiding surfaces such as the ways of lathes and planers.

Santa Fé Repairs Handled with Modern Equipment

By FRANK W. CURTIS
Western Editor, American Machinist

Toolroom equipped with heat-treating units of modern design—Grinding operations applied to a wide variety of parts—Equipment for flanging and trepanning flue sheets

ONE of the recent additions to the toolroom at the Albuquerque shops of the Atchison, Topeka & Santa Fé Ry. Co., is a heat-treating unit. The equipment includes two furnaces and an oil-tempering bath, all of which are electrically heated. In Fig. 9, is shown the arrangement of the equipment. The furnace at the right is suited for work necessitating medium heats, and the one next to it handles tools requiring higher heats, such as those made of high-speed steels. Instruments on a switchboard at the left automatically control the units and record the heats. Oil- and water-quenching tanks are located in front of the furnaces in a convenient position. A set of instructions for hardening and tempering miscellaneous tools is mounted on a card hung on the wall, and instructions for operating the furnaces are attached to the switchboard.

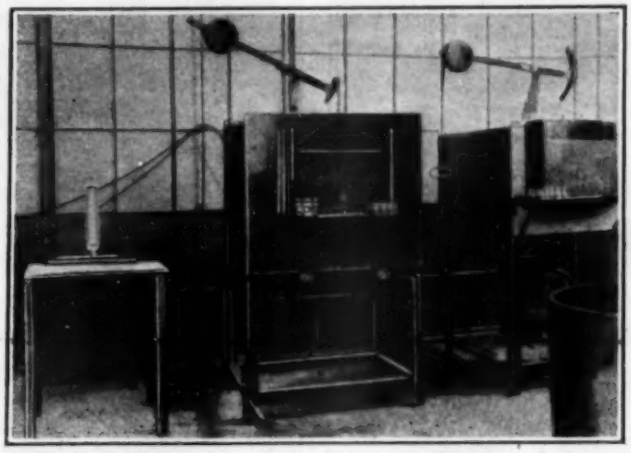


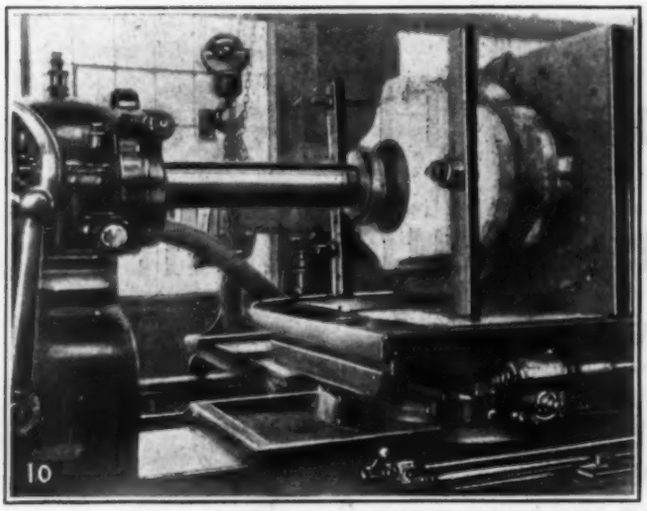
Fig. 9—Modern heat-treating equipment installed in the toolroom

That grinding equipment is recognized as a necessity in the railroad shop is evidenced by the different forms of grinding operations performed in these shops. In Fig. 10 is shown a side rod having one of its holes ground on an internal grinding machine. The work is clamped to the angle plate against a spacing ring so that ample clearance for the abrasive wheel is provided when it reaches the rear side of the rod. The outer end of the rod rests on a traveling support that moves with the machine table. The practice followed in reconditioning rods is to merely clean up the bore, then fit a brass bushing to it. New rods are ground to a specified diameter. Air-pump cylinders also are ground in the same machine, necessitating a work-holding fixture of the spacing type that aligns the work horizontally and vertically so that all bores can be ground in one set-up.

Link blocks and links are ground in the machine illustrated in Fig. 11. The link shown in place is supported by two U-shaped brackets that are attached to the radius rod of the machine. Each bracket has two setscrews for holding and aligning the link. Old links are reconditioned by removing sufficient material to produce a smooth surface. New links are machined first by drilling and slotting the opening, then by grinding, as shown, in which approximately $\frac{1}{32}$ in. of metal is removed from each side. The work is handled to and from the machine by chain falls. Axles, piston rods, valve rods, crankpins and miscellaneous cylindrical parts are ground in the machine shown in Fig. 12, where the work in place is a piston rod. In reconditioning worn piston rods it is generally necessary to grind them with the piston in place. To accommodate this class of work, the machine has a gap suited to swing a 36-in. piston. An abrasive wheel, 28x4 in., is used. Many flat-surfaced parts, such as guides, links, shoes and wedges, link blocks and crosshead gibs, are surface ground to size. In Fig. 13 is illustrated the machine used in which a liner for a pedestal jaw of a tender truck is shown set up. First, the work is positioned on the magnetic chuck as shown at *A*, so that the edges can be surface ground. Then, it is reset by its edges so that the back side can be completed. In grinding the side faces, liners are clamped to the table of the machine. After one side has been completed, the work is located against parallels for alignment. The width of the liners is held to 5 in., and approximately $\frac{1}{16}$ in. of metal is removed from a side. Work of this kind is run through in quantity lots of 10 to 20 pieces.

In preparing flue sheets, the first operation performed is to cut out the contour required, after which the flue holes are punched, the edges of the sheet are flanged, the flue holes are enlarged by drilling, and the superheater holes are trepanned. The sheets are then completed by punching the rivet holes in the flanged face. In Fig. 14 is shown a $\frac{7}{16}$-in. back flue sheet being flanged.

The second and concluding article.



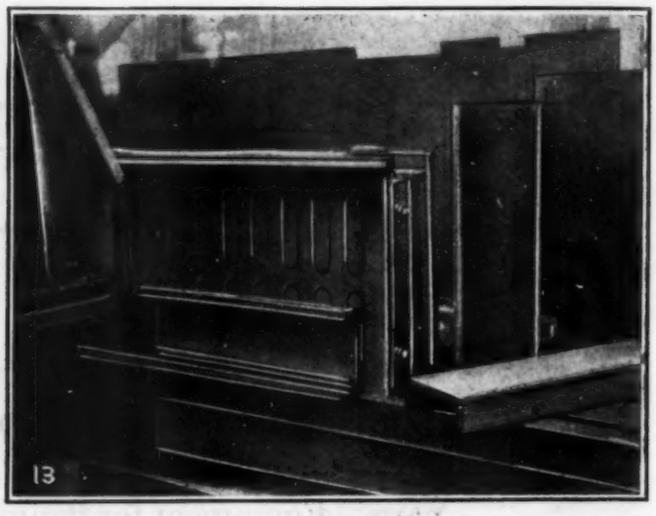
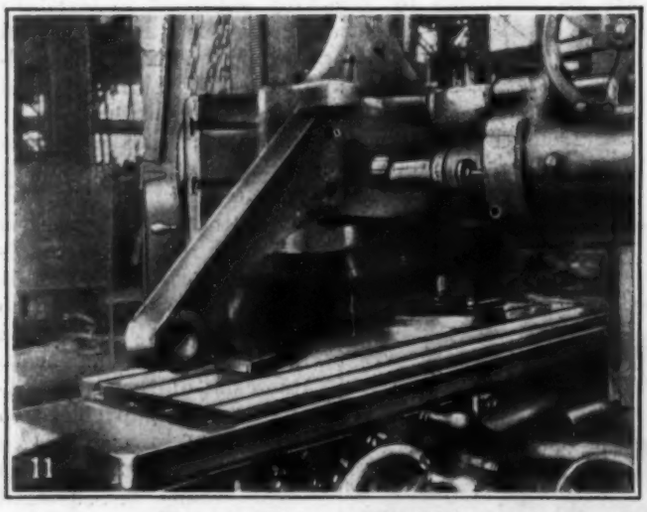


Fig. 10—After the rod holes for the bronze bushings have been machined by boring or trepanning, they are finished by grinding in a machine of the planetary type. Fig. 13—Liners for pedestal jaws of tender trucks are ground to size



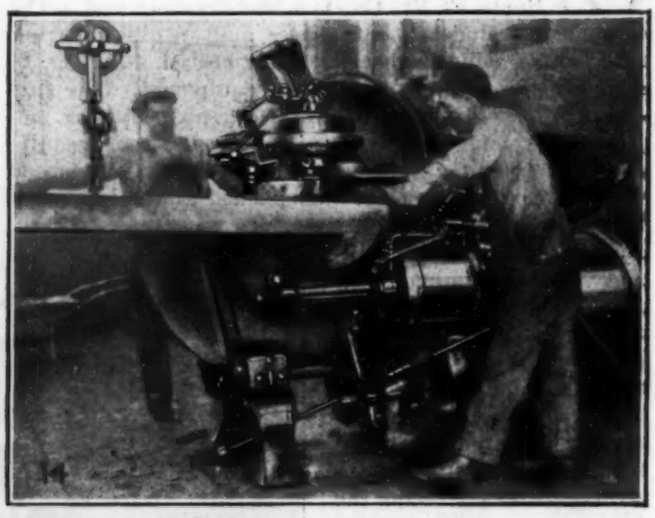
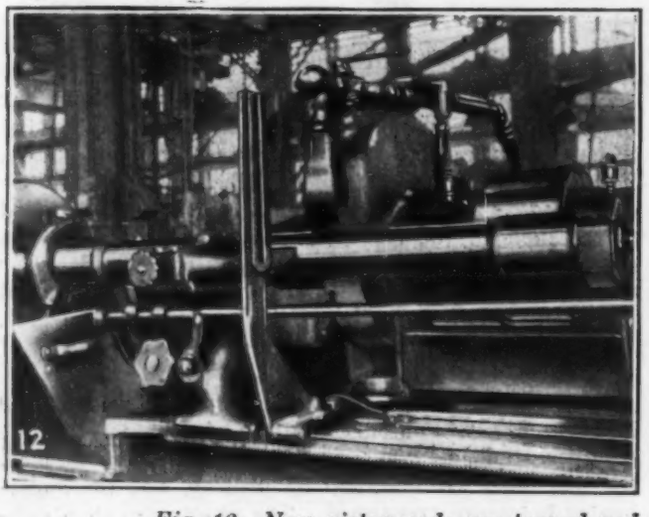


Fig. 11—Valve-motion links are casehardened and can be finished only by grinding. The grinding machine is fitted with a radius attachment that causes the wheel to travel in a circular path of the same radius of that of the link. Fig. 14—After all the holes have been finished, the flue sheet is flanged



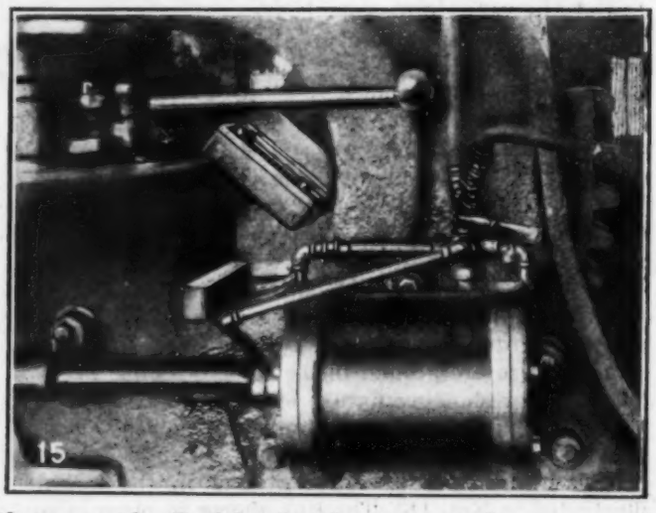


Fig. 12—New piston rods are turned and then ground. Reclaimed rods are ground without being turned. The grinder removes a minimum amount of metal in cleaning up the worn spots. Fig. 15—A close-up view of the flanging machine is shown

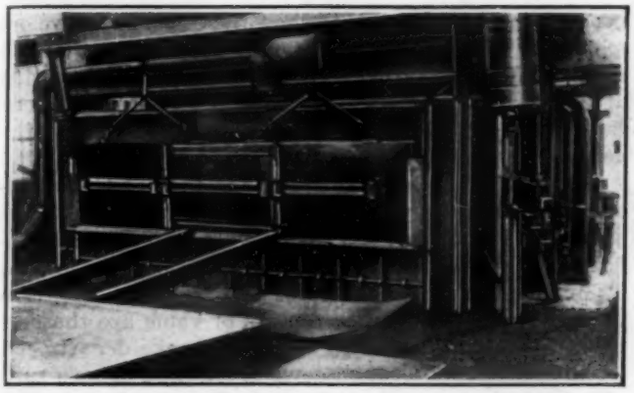


Fig. 16—Furnace used for annealing flue sheets

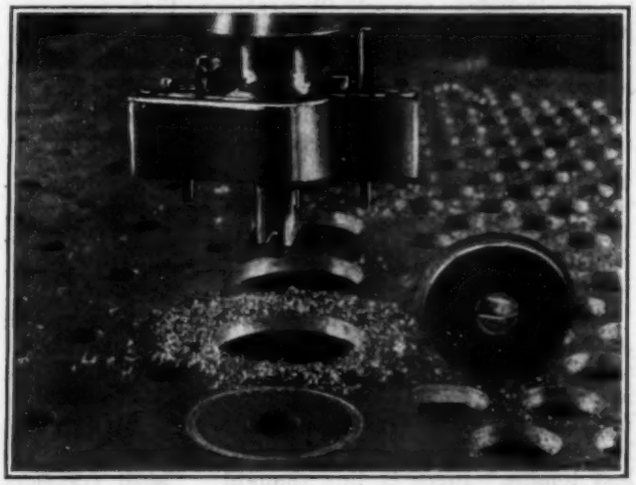


Fig. 17—Trepanning tool for superheater flue holes

The machine is operated by two men. In Fig. 15 is shown a close-up view of the flanging machine. An air cylinder on the side of the machine is operated to clamp the work in the position desired. A larger air cylinder in the rear of the machine is connected to a sector to which the flanging arm is attached. The furnace in which flue sheets are annealed after flanging is shown in Fig. 16. It is oil-fired and can complete the heating of a sheet in 30 min. All flue sheets are annealed before they are straightened. The furnace is constructed so that its greater portion is outside of the building, thus consuming less floor space within the building.

In Fig. 17 is illustrated a trepanning tool for cutting out superheater holes in flue sheets. A 1⅞-in. pilot fits into the previously punched hole to guide the trepanning tool in which two adjustable cutters are used. The hole being cut is 4⅝ in. in diameter, and the thickness of the plate is ⅞ in. One of the sections removed is shown standing at the right. The tool is operated at 27 r.p.m., and 0.006-in. feed per min. Lubricant is fed to the tool from a portable tank.

If you are out of a job, get busy and hunt one, instead of loafing around and depending on the Lord for your daily bread. He isn't running a bakery.

Several large railroad shops have rolling mills as part of the equipment, one, at least, of these is reclaiming old locomotive tires to make bolts for superheaters and for other work where strong material is needed.

An Old-Time Diehead

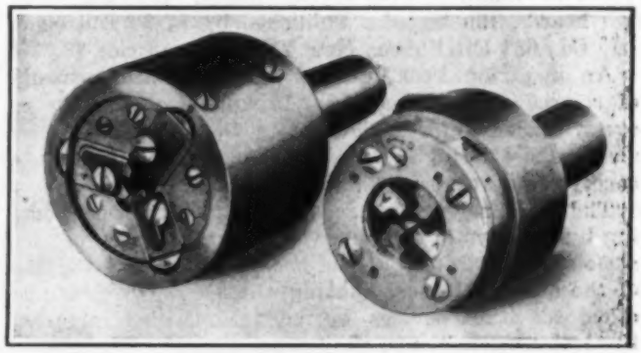
OF the two self-opening dieheads shown in the accompanying illustration, alike in size and not differing greatly in general appearance, not the least interesting feature lies in the fact that the one at the left was made in 1876 and the other one in 1927; fifty-one years later. While many refinements have been made in screw threads during that long interval, it is evident that the mechanics of fifty years ago were quite conversant with good mechanical principles.

The old die was made by T. Rupert in the Singer shops at Bridgeport, Conn., and it is to be presumed that he made it to produce screws for sewing machines. From its shape it is to be presumed also that he intended to use it—and probably did use it—in some kind of a screw machine, though screw machines, of the automatic type at least, were not very numerous or popular in those days.

The shell and shank of the old die are in one piece, as they are in the new one. In the bore of the shell, three wedge-shaped pieces of hardened steel are secured by screws in such manner that minor adjustments may be made by turning the rear screws. The inner part has a longitudinal movement of about ¼ in., and is restrained by keys from turning in the shell. Integral with this part is a stem that extends through the bore of the shank, and a large shouldered screw tapped into the end of the stem limits the longitudinal movement.

Three radially-disposed jaws in the inner member have their outer ends beveled to correspond to the wedge-shaped pieces in the bore of the shell, and each jaw is provided with a pocket and a screw to hold and secure the chaser. The main difference in the new die, aside from the fact that it has four chasers instead of three, is that the chasers themselves are the jaws, while in the old one they are separate pieces.

When the die is presented to the work, the inner member is pushed back until it bottoms in the recess of the



Old and new threading dies

shell, at which time the jaws are closed and the chasers are in position to cut a thread upon the work. When the slide of the operating machine reaches its limiting stop and its forward movement ceases, the chasers continue to advance by screwing themselves upon the work until the jaws are opened. The chasers do not withdraw quickly, by spring action, as do those of the new die, but run out gradually.

The new die is the latest product of the Eastern Machine Screw Corporation, and it is by the courtesy of the officials of that corporation that we are permitted to print this article and its accompanying illustration.

Book Reviews

China. A Commercial and Industrial Handbook. By Julean Arnold, Commercial Attaché, in collaboration with American consular officers and other contributors. Eight hundred eighteen pages, 6x9 in., cloth boards. Cross-indexed. Twenty-five illustrations, a general map, and many tables. Published by the Bureau of Foreign and Domestic Commerce, and sold by the Superintendent of Documents, Government Printing Office, Washington, D. C. Price $1.75.

This volume is one of the most timely and most complete books ever issued by the Department of Commerce. The book opens up with a condensed geographic description of the country, taking up each separate province, including the so-called Chinese dependencies of Mongolia, Tibet, and Sinkiang. This is followed by a sketch of Chinese history written by Dr. F. L. Hawks Pott, President of the St. John's University at Shanghai. A hundred and twelve pages are then devoted to a comprehensive study of Chinese trade by Commercial Attaché Arnold, and another 73 pages to an analysis of Chinese export products, industries, and economic structure. Other subjects discussed in separate chapters are: Advertising, market development, incorporation, finance, exchange, railways, social customs, judicial procedure, and trade organizations. Each American consular district in China is then reviewed in detail by a consular officer of the respective district. The China Trade Act is given in full in the appendix. The book is a most complete work of reference for anyone having commercial relations with China or seeking information on the country.

Marvels of Modern Mechanics. By Harold T. Wilkins. Two hundred and eighty pages, 6x9 in., cloth boards, illustrated. Published by E. P. Dutton & Co., 681 Fifth Ave., New York City. Price $3.

An inspiring book, dealing with the achievements of science and engineering. It will be a stimulus to every reader, interesting him to the point of enthusiasm, and stirring his imagination toward attempts to conceive of progress still to be made.

The atom, salvage of treasure from the sea bed, curing by the rays of the sun, wireless, the gyroscope, are some of the subjects of the book. Others are the use of the airplane in seal hunting, the use of wireless and other scientific devices in navigation, air transport, theatrical mechanisms, the "Rotor Ship."

Proceedings of the Fourteenth Annual Convention of the American Railway Tool Foremen's Association. One hundred seventy-five pages, 5½x8 in., flexible cloth-board covers. Published by the secretary, G. G. Macina, 11402 Calumet Ave., Chicago, Ill. Price $2.50.

A sufficient number of special tools are required in a railroad shop to utilize the full time of a toolroom staff for their manufacture and maintenance, and it is to this end that the American Railway Tool Foremen's Association holds annual meetings to discuss the most valuable of these devices, also to apply such standards as are worthy of consideration. In presenting the year book, the main purpose is to show the important developments that have taken place in the railway repair field as presented by various committees. The publication of discussions, in connection with the topics, has been limited to only the necessary amount, thus making the volume resemble a text book.

One of the outstanding reports is that of the standardization of boiler taps. The recommended standards, as adopted by the association, are shown. These specifications have been presented for approval to the A.R.A. Their adoption marks a step of progress long sought in the railway shops. Other reports of value are those of new tools and devices used in the air-brake department, locomotive shop kinks and devices, training of men suitable for toolroom work, and new tools and safety devices for the car department. The presentation of these topics includes several illustrations that represent modern methods.

In general, the information shown is applicable to most any type of railroad repair shop and should be particularly interesting to the toolroom supervisor, the shop foreman, and the superintendent.

Tips for Traveling Salesmen. By Herbert N. Casson. One hundred forty-four pages, 5x7½ in., flexible covers. Published by B. C. Forbes Publishing Co., 120 Fifth Ave., New York City. Price $2.

Although some of the things said about salesmen in Mr. Casson's little book hardly apply to equipment salesmen, there are many other sound bits of advice not only for salesmen but for any of us who have to make contacts with others in the routine of business. For instance, in the chapter called "Use more ear and less tongue," there is this thought: "Most travelers fancy that they are paid to talk. They are not. They are paid to sell—quite a different thing. They drown their customers in a flood of talk; and then go to bed without a guilty conscience."

In the chapter on new markets this statement is made: "Every keen ambitious traveler must do missionary work for at least half-a-day a week. Now and then, he might spend a whole week in calling on non-customers and none else. That would be a week well spent."

The author's style is concise and picturesque. His book is not only profitable reading but pleasant as well.

Year Book, 1927, American Institute of Electrical Engineers. Five hundred ninety-four pages, 6x9 in., cloth binding. Published by the American Institute of Electrical Engineers, 33 West 39th St., New York City. Price $2.00 to non-members.

This book, while primarily devoted to an alphabetical and geographical list of the membership, also contains lists of sections and branches, committees, and past officers. General information, constitution and by-laws, and report of board of directors complete the volume.

S.A.E. Handbook, March 1927. Semi-annual revised edition. Bound in flexible leather covers, 4x7 in. Illustrated. Indexed. Published by the Society of Automotive Engineers, 29 West 39th St., New York, N. Y. Price to non-members $5. This book as in previous issues contains S.A.E. Standards and Recommended Practices, comprising now over 600 specifications. Since the last issue, sixteen specifications have been revised, eight canceled and five new ones added.

Handling and Machining a Big Gas Engine Bed

By E. H. BRINKER
Superintendent, the Hooven-Owens-Rentschler Co.

Transporting the casting from foundry to machine shop—Using a 48-in. planer as a draw-cut shaper—Shipping the finished piece

THE Hooven-Owens-Rentschler plant at Hamilton, Ohio, is equipped to handle large work but the machining of four gas engine beds for a steel mill included one operation, the finishing of the cross-head guides, for which none of the available equipment would answer. Two views of the first one of the four beds to go through the shop are shown in Figs. 1 and 2. Some idea of the size of the piece can be had by comparison with the men standing on and near it.

A better idea of the weights involved is given by some of the foundry statistics. The pit for the casting was 18 ft. wide, 36 ft. long and 10 ft. deep, and it was necessary to build up the sides 18 in. by means of a cast iron frame. It took 6 weeks to make the mold and 8 weeks to build the pattern. One hundred and thirty tons of iron were melted for the casting and 120 tons were poured using 8 ladles. Sixteen days were required for cooling and 2 weeks for cleaning the big casting, which weighed 140 tons as it came from the pit. Three cranes acting through an equalizer bar were used to lift it. Moving the casting from foundry to machine shop across the intervening street was accomplished by means of a borrowed 100-ton flat car. Then the two machine shop cranes took the piece between them and set it down in front of the Morton draw-cut shaper so that the pillow-block jaws could be planed and the various external pads faced. The man on top of the casting in Fig. 1 is standing on one of the jaws.

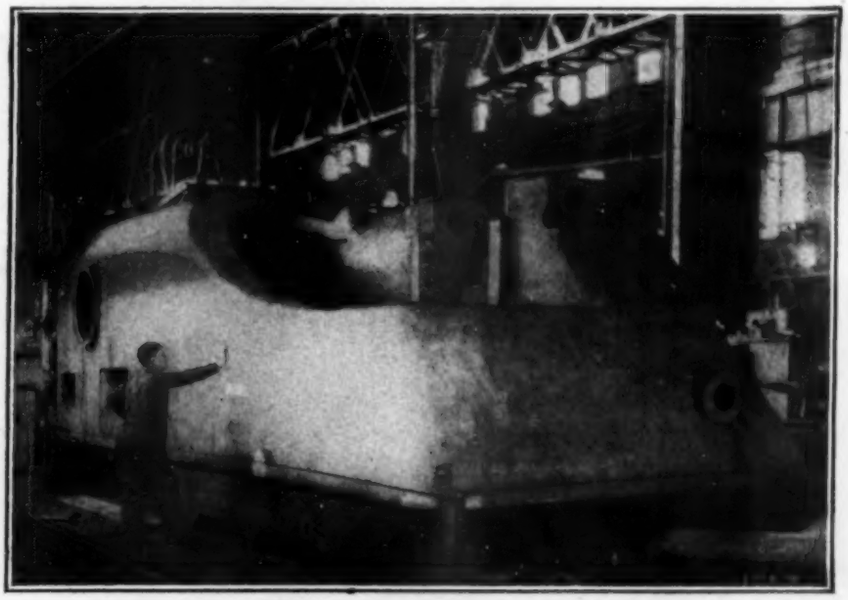


Fig. 1—End view of gas engine bed set up on floor plate

For the remaining operations the work was moved to the floor plate and leveled up. Then a horizontal boring machine was brought up to bore out the end and face it.

Everything up to this point had been plain sailing but now came the question of how to finish the flat cross-head guides. Planing was impossible because of the fact that the bed was in one piece. The Morton shaper had not sufficient reach. After some hard thinking the idea was conceived of using a planer as a draw-cut shaper. For this purpose a 48-in. planer with long, sectional bed was fitted up.

As shown in Fig. 2, the front section of the bed was removed, thus bringing the housings quite close to the faced end of the work. To stiffen the table of the planer two heavy castings with I-shaped cross-sections were bolted to it but there was still some deflection and it was therefore necessary to fasten bronze shoes beneath the end of the table. These shoes ran on square steel tracks or gibs that were bolted to the work. Fig. 3, taken inside the casting, shows the shoes and track. To the end of the planer table was bolted a special angle plate so designed that a planer cross-rail with tool block reversed could be fastened to it. The tool thus lay in between the rail and the angle plate and cut on the inward stroke relative to the planer housing, thus tending to draw the planer bed against the work. Fig. 3 shows the arrangement. A star wheel on the end of the feed screw was actuated by a

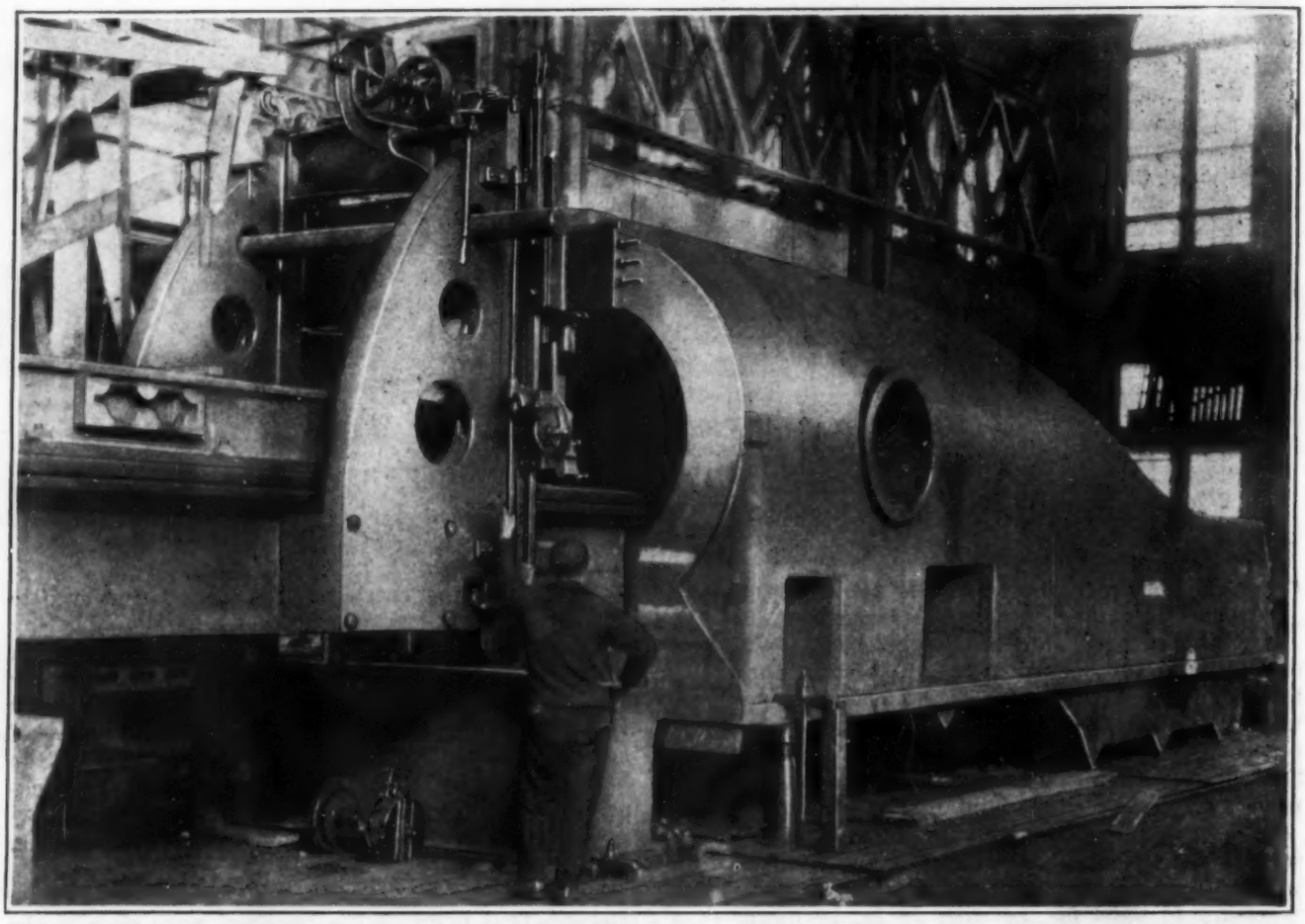
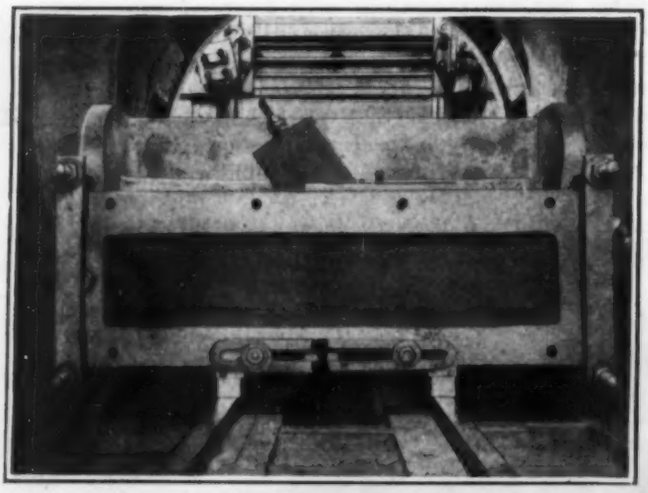


Fig. 2—Forty-eight-in. planer in position for planing crosshead guides



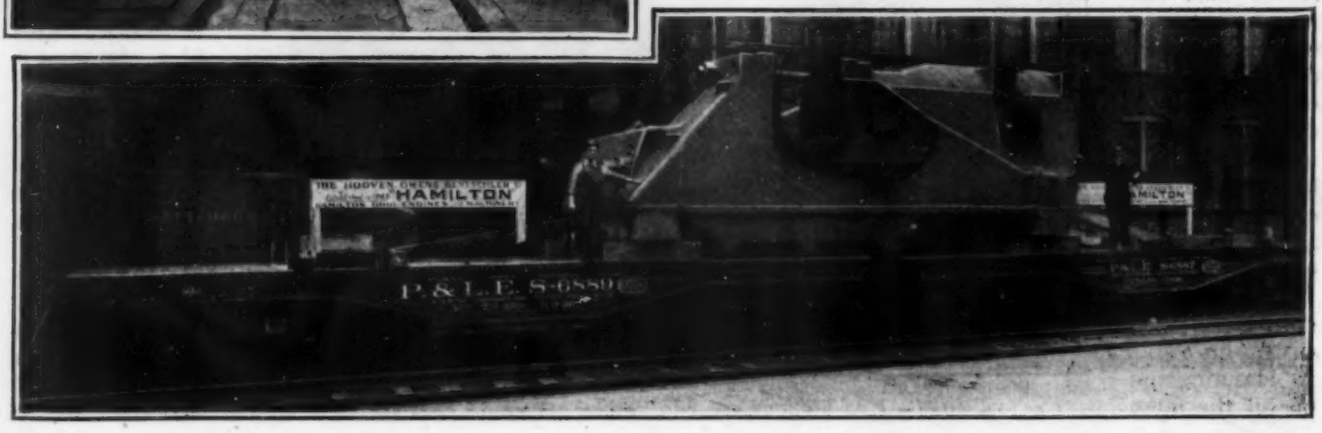
pin in the planer bed to take care of the feed. The star wheel can be seen in the illustration.

Several minor drilling and facing operations were performed by a radial drill and a horizontal boring machine, brought up in turn to the work.

As shown in Fig. 4, the finished piece is mounted on swiveling supports on two 100-ton flat cars for shipment to its final destination.

Fig. 3—View of special tooling attached to planer table

Fig. 4—Finished piece on flat cars for shipment



Applying Electrical Equipment to Production Machinery

By Robert Corey Deale
Electrical Engineer, Niles-Bement-Pond Co.

Motors and controllers for shapers and slotters—Drive for sensitive drilling machines—Arrangement of controls on radial drills—Reversing-motor-driven drills—Clamping motors—Boring mills

SHAPERS and crank slotters are much the same as crank planers. The oscillation of the cutting tool is accomplished mechanically, with the driving motor running always in the same direction. Constant-speed motors may be used in connection with a gear box, for obtaining a change in cutting speeds, or adjustable or multi-speed motors may be used.

Probably the best equipment to use for a d.c. driven slotter is an adjustable-speed motor with a simple dynamic-braking controller, operated from a push button located on the frame of the machine, and with a field rheostat for adjusting speeds located as near the operator's position as possible, usually on the frame. By using a motor with a four-to-one speed range, gear changes are usually unnecessary. A drum controller can be used where it is possible to mount it in such a location that it can be easily manipulated by the operator, without interfering with the operation of the machine. In the case of the 12-in. slotter shown in Fig. 105 this has been accomplished very well. For a traverse motor a small series or compound-wound fully-inclosed motor should be used, with some form of reversing controller. A small reversing drum is entirely satisfactory if it can be mounted so as to be accessible without interfering with other operations of the machine. It is frequently difficult to fulfill these conditions, and in such cases a reversing controller operated by a push button should be used.

For alternating current, a constant-speed squirrel-cage induction motor in connection with a change speed gear box may be used. A better arrangement would be a four-speed squirrel-cage motor without the gear box but with a drum switch for changing speeds. A slip-ring motor is absolutely unsatisfactory if used as a variable-speed motor. For either type of motor an automatic controller, preferably of the primary-resistor type, should be used as it is frequently desirable to jog the ram of a slotter, and it has been found that compensator-type starters are unsatisfactory for jogging service. For traverse of the table a small squirrel-cage motor, with a half-high-resistance rotor, having an automatic or drum reversing switch should be used. A shaper either of the ordinary variety or with a traveling head, is much the same as a slotter except that shapers seldom have traverse motors. Also there is usually more room

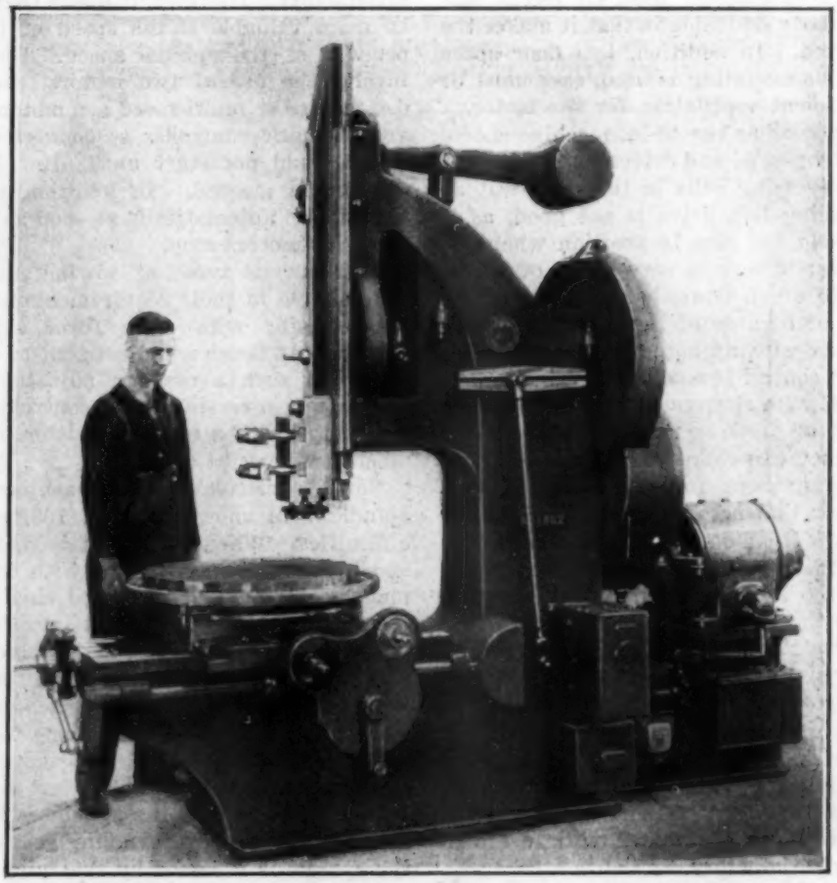
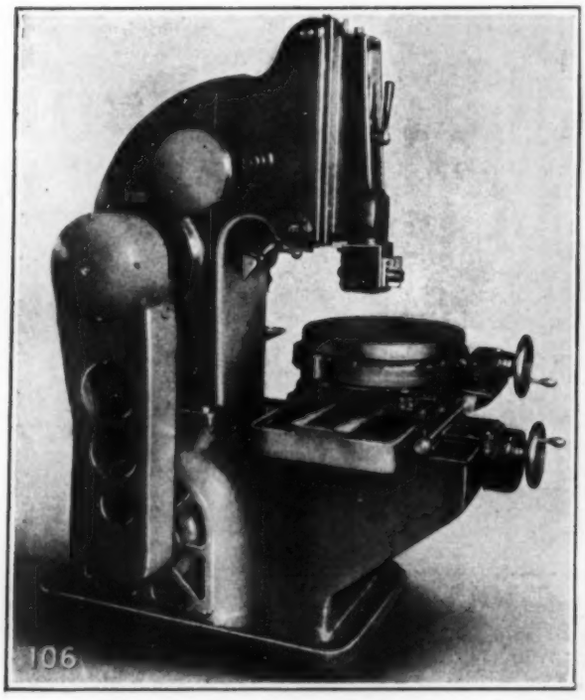


Fig. 105—Drum controller for d.c. motor driving slotter

The thirteenth article. The fourteenth will appear in an early issue.



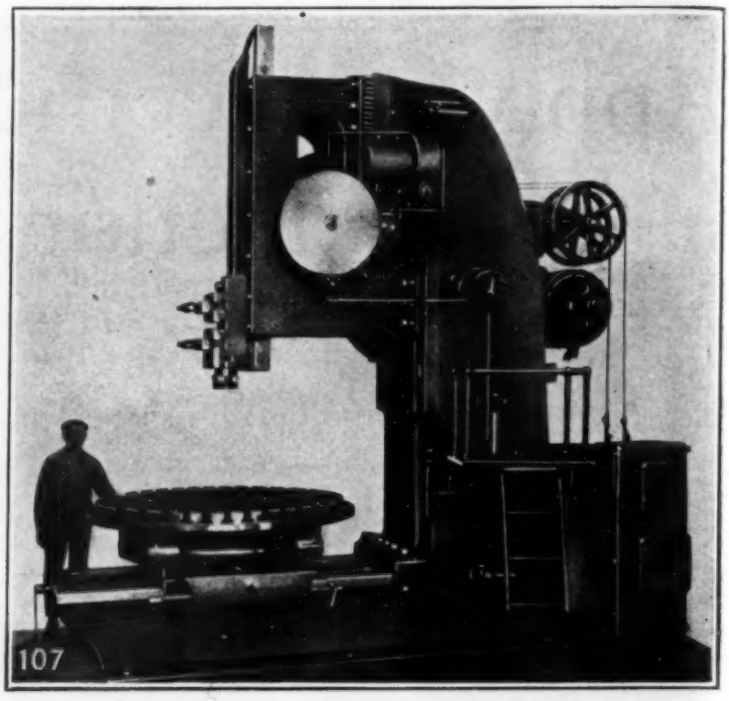


Fig. 106—Vertical shaper with motor in base. Fig. 107—Large slotter with reversing motor drive

for mounting a controller, so that a non-reversing drum controller may usually be used.

The vertical shaper shown in Fig. 106 is practically a slotter, although called a shaper. It is built with the driving motor inside the pedestal, as can be seen. This construction has been extensively used on recent machines, and is particularly desirable in that it makes the machines self-contained. In addition, less floor space is required. When this mounting is used, care must be taken to provide sufficient ventilation for the motor.

The larger slotters, such as the 48-in. machine shown in Fig. 107, are usually geared and driven by a reversing planer motor or by reversing belts in the same way as a planer. The reversing belt drive is not good, as it does not positively hold the ram in position when the machine is shut down. There is very much of a tendency for the ram to creep down because of friction with driving pulleys or because of its weight. Reversing motor drive, either with an automatic controller or with motor-generator control is much preferable. Electric feed is very usual with slotters of this type. When so used the amount of feed is usually regulated by controlling the number of revolutions of the feed motor. The usual arrangement for accomplishing this consists of a small box that acts as an adjustable limit switch, in connection with an automatic controller. The length of time that the feed motor is connected to the line, and consequently the amount of feed, may be adjusted by a dial on the front of the box.

Keyseaters and filing machines are small crank driven machines somewhat similar in principle to a slotter. However, they usually operate only at the one speed and consequently require a constant-speed motor with any type of manual starter. For direct current, a semi-inclosed shunt-wound motor with an inclosed faceplate starter may be used, while for alternating current a manual across-the-line type of starter with overload protection is entirely satisfactory.

Keyseat drills usually have a single motor, which operates both the spindles and the traverse mechanism. Mechanical means are provided for reversing the traverse. As the machine is usually built, an adjustable-speed d.c. motor with a non-reversing drum controller, or a multi-speed squirrel-cage a.c. motor with a manual compensator or a resistor type of starter should be satisfactory. However, it seems that the machine would be more valuable if the speed of traverse were independent of the spindle speed. This condition would involve the use of two motors, each adjustable-speed d.c. motors or multi-speed a.c. motors. There should be an automatic controller so connected that the traverse motor could not start until after the spindle driving motor had started. In addition the traverse motor should stop automatically as soon as the spindle driving motor or motors stop.

The various types of sawing machines are usually very simple in their requirements and take a constant-speed motor with some form of manually-operated starter. At times an adjustment of speed may be desirable. In such a case an adjustable-speed d.c. motor with a non-reversing drum controller, or a multi-speed a.c. motor with a manual resistor or compensator type of starter may be used.

Small, sensitive drilling machines, such as the two-spindle drill shown in Fig. 108, seldom present any difficulties. When not belt driven, they usually have a small, constant-speed motor with the simplest kind of manual starter, and the speed changes, if any, are obtained by a cone pulley built into the machine. In the machine shown the cones may be seen at the top of the spindles. Adjustable-speed motors are not usual in the horsepowers used on these machines. Bench drilling machines are driven in the same way.

With the heavy-duty drilling machines of both radial and vertical types, the electrical equipment falls into two classes. In one, the spindle is reversed by friction clutches that engage reversing gears, while in the other the spindle is reversed by reversing the driving motor, thus eliminating clutches entirely.

With the mechanical-reverse type of machine, almost

any type of equipment may be used; a non-reversing drum, a single manual starter, or a full-magnetic starter. As the motor is only started and stopped two or three times a day a simple manual starter providing undervoltage and overload protection is all that is necessary. Adjustable-speed motors are usually used where direct current is available in order to obtain as many changes of speed by the motor as possible. The field rheostat should be put as close to the operator's position as conditions permit to make a change of speed possible with little delay. This placement is a little difficult with a radial drill, as there is seldom any vacant space on the front of the head. It is probably a better plan to use a drum switch, mounted on either the rear of the arm or back of the motor and connected to a spline shaft which is operated from a handle at the head. Another good arrangement is to mount the controller at the back of the head as at *A* in the case of the radial drill shown in Fig. 109, so that it may be connected by gearing and shafts to a handle in a convenient location at the working position. The controller must then be connected with the motor terminals and line wires by wires in some form of flexible conduit. This can be so arranged that it makes a very good job.

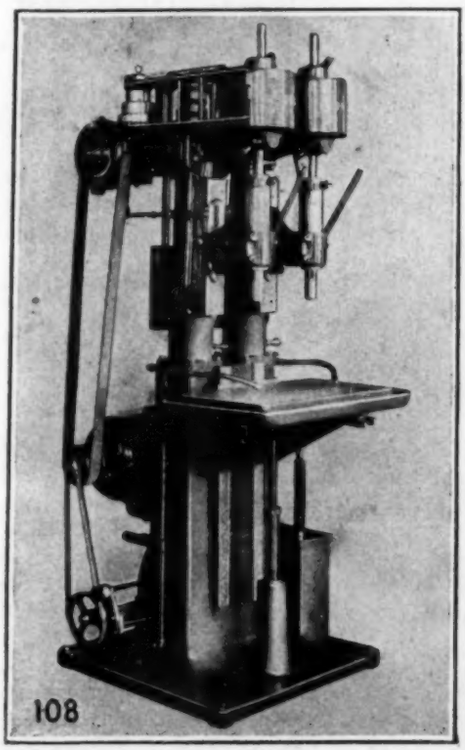
When a.c. driving motors are used, it is usual to use constant-speed motors with some form of manual starter and with a gear box to obtain changes in speed.

Where it is desired to reverse the motor to reverse the spindle some form of reversing controller must be used. This may be of the drum type or an automatic with some form of drum master switch. Both have their advantages, but it is believed that a good drum controller in the hands of a careful operator is more satisfactory than is an automatic. It is certainly cheaper and it will be found for small horsepowers, that the drum controllers are simpler, more rugged, and less likely to give trouble than the corresponding magnetic panels. It is also believed that an operator can control his motor to better advantage with a drum controller while using the machine for tapping than when an automatic controller is used. Controllers of this type should always provide dynamic braking.

In Fig. 110 is shown a heavy-duty vertical drill driven by an adjustable-speed d.c. motor which is built into the machine, and with an automatic panel controlled by a reversing drum master switch.

For machines having friction clutches for starting, stopping and reversing the spindle, a standard squirrel-cage motor should be used for driving the machine, with some simple controller. A manual resistor or compensator type of starter with overload and undervoltage protection will be very satisfactory, and will be cheaper than any form of magnetic controller.

For machines in which the spindle is reversed by reversing the driving motor, the standard squirrel-cage motor is not very satisfactory because of its relatively low starting torque. It would be difficult, if not impossible, for this type of motor to start or reverse when directly coupled to a large tap that is embedded in the work. A slip-ring motor may be used, however, because of its starting characteristics. A drum controller may be used for controlling both primary and secondary, but it is believed to be better practice to use a drum for the primary only. A magnetic-type automatic controller may be used to cut out the resistance in the secondary or rotor of the motor, but is somewhat expensive. A better arrangement, which gives the same effect, consists of a set of resistors and inductors connected in parallel, which are connected to the slip rings of the motor. This combination operates in such a way that it gives maximum effect when plugging, as is desirable. When the motor is started nearly all the secondary current is forced through the resistors, thus giving a high starting torque with a relatively low



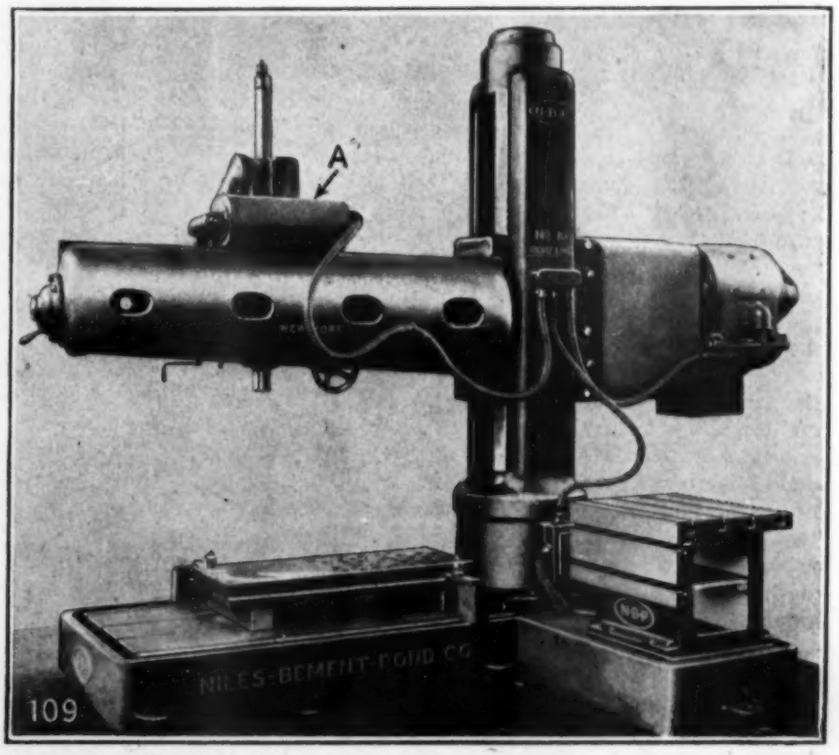
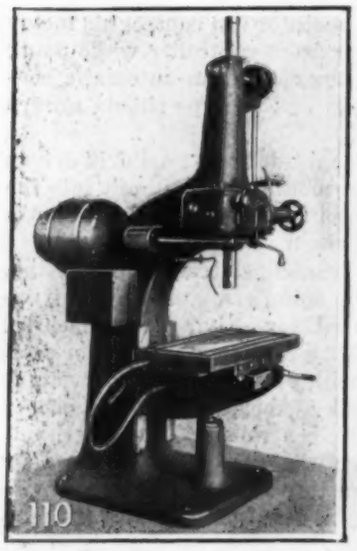


Fig. 108—Sensitive drilling machine. Fig. 109—Position of controller and arrangement of conduits on a radial drill



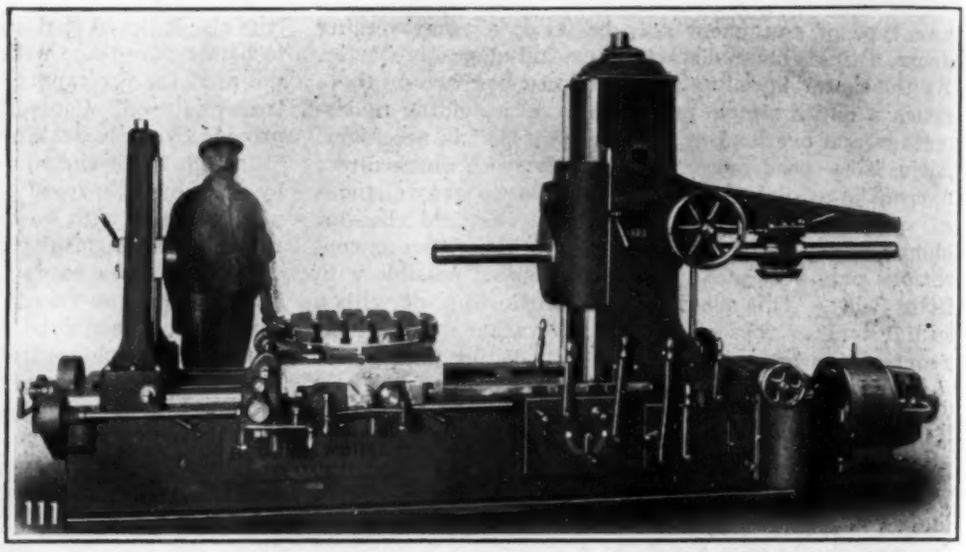


Fig. 110—Heavy-duty drill with built-in motor drive. Fig. 111—Boring mill driven by a variable-speed d.c. motor

starting current. As the motor comes up to speed, more and more of the current is diverted to the inductance coils which have little effect at full speed, and the result is that the slip rings are practically short-circuited. In this way the good effects of the magnetic controller are obtained without its faults. Over a period of five years in which it has been in use, there has been no case of trouble with an equipment of this type.

An automatic reversing switch could be used for the primary, operated by a small drum master switch connected to the operating lever. There is no real advantage in this equipment over the reversing drum as it only adds another piece of electrical equipment with consequent greater liability to trouble.

On a radial drill, the column swings with respect to the base, and some means must be provided to clamp the two to each other while operating the machine. The quickest and best way is to provide a small reversing electric motor operated by a small reversing drum switch on the head. There seems to be no good way to shut off the motor automatically when the limit of motion has been reached, although such a control is possible. If the clamping motor should be so connected as to shut itself off, it might work very well when first adjusted. When the machine becomes somewhat worn the motor will still make the same number of revolutions, and the column will not be clamped tightly to the pedestal. Some method of operation that always gives the same clamping effect is much preferable.

The best method seems to be to design the motors so that they will withstand stalling under the load, with additional capacity to allow it to remain stalled for a reasonable period, such as three to five minutes, without undue heating. Under ordinary circumstances it is not necessary that the motor should be energized for more than five to six seconds at a time. The three- to five-minute provision is specified to give a margin of safety. Both a.c. and d.c. motors used for this service are series wound. The a.c. motors should have the compensating field shunted by an external resistor to decrease the no-load speed, and so prevent the armature from storing up an excessive amount of kinetic energy, which may lock the clamp so tight that the motor has insufficient torque to unlock it. With any ordinary care this type of motor and control should give no trouble whatever.

For driving coolant pumps constant-speed, shunt-wound motors running at 1,800 or 1,200 r.p.m. and having some form of simple manual starter are usual.

Horizontal boring machines take exactly the same type of equipment as a drill, as the operations are identical.

The boring machine shown in Fig. 111 is driven by a shunt-wound, adjustable-speed motor. This is started, stopped and reversed, and has its speed adjusted by the reversing drum controller mounted vertically just in front of the motor. This controller may be operated from either side of the machine by handwheels, which may be seen mounted on a shaft crossing the bed of the machine. This shaft in turn is geared to the operating shaft of the drum.

Vacations for Industrial Workers

THE feasibility of industrial plants offering employees vacations is being discussed in *New York*, a weekly journal sponsored by New York University. Queries were put to leaders of opinion, who are mainly heads of industry, by the editor.

The question is more than an academic one as the Standard Oil Co. of New Jersey now has a vacation plan for wage earners. It provides for one week's vacation with full pay to employees of one year's total service, the last ten months of which are continuous, and two weeks' vacation with full pay to employees of five years' or more total service, the last ten months of which are continuous. The purpose is twofold: preparation for another year of service, and a reward for faithful performance of work already done.

Even though the vacation plan is espoused by some of the larger companies progress will, no doubt, be gradual because of the difficulties felt by many industrialists. Production in a modern shop is based upon a series of specialized operations and a break in the chain will throw the whole system out of order. If vacations are all given at one time the shop will have to shut down.

A vacation is a clear cut business arrangement which, in white collar occupations, has been found necessary and desirable. It is one of the few social links connecting the high and the lowly and the physical refreshment from a vacation is no more important than the intellectual and spiritual benefits.

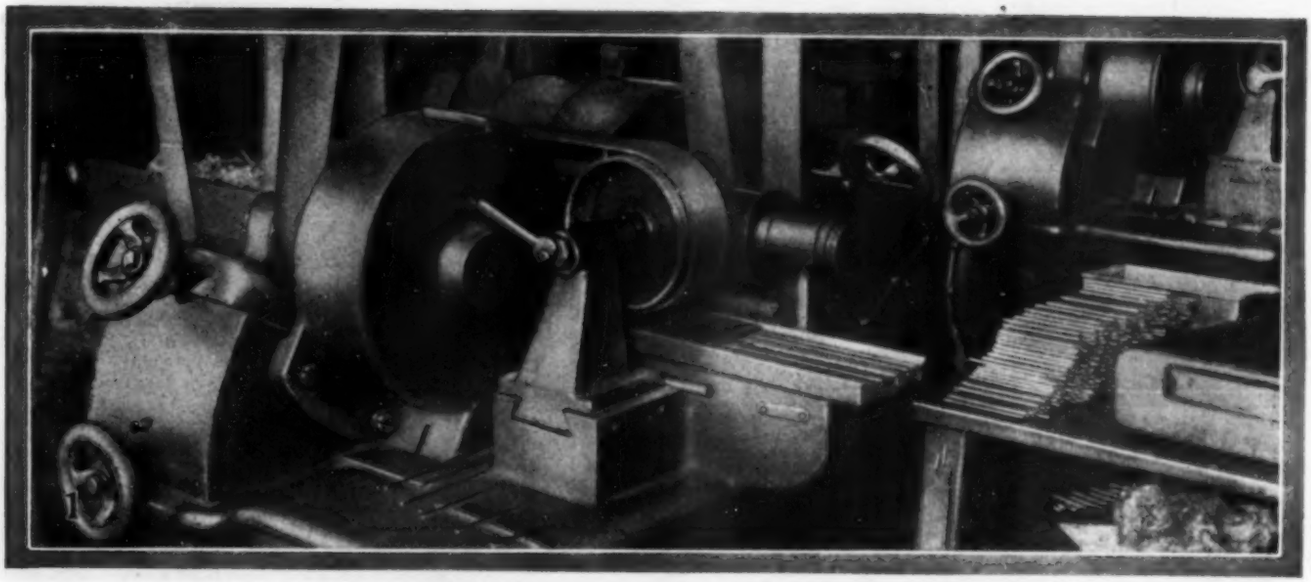


Fig. 1—Pointing the ends of wire drill blanks on double-end grinding machine

High Spots in Twist Drill Making

Photographs by courtesy of the Morse Twist Drill & Machine Co.

Fig. 2—Grinding circumferential relief on wire drills

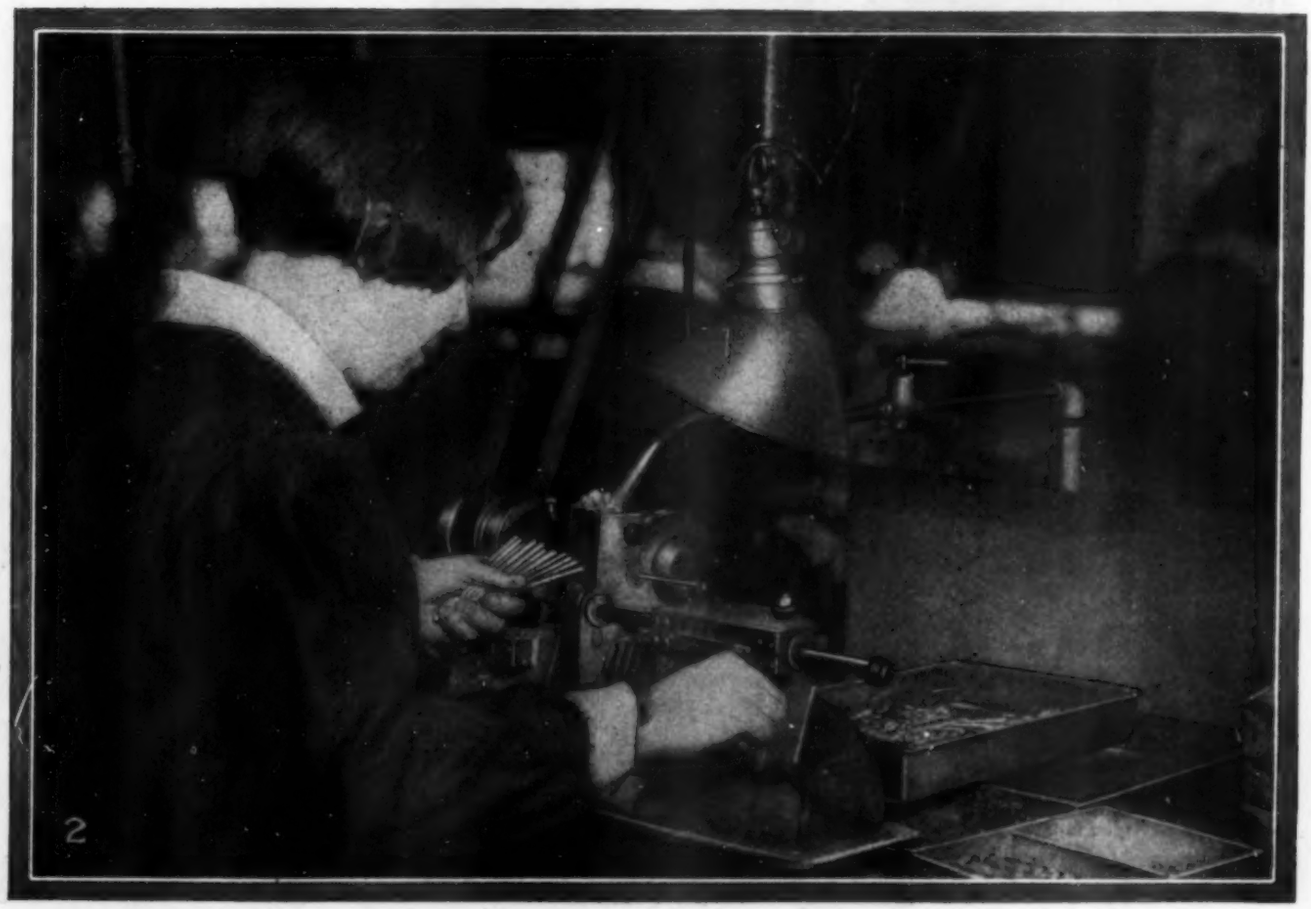


Fig. 3—The points of very small wire-size drills are ground by hand

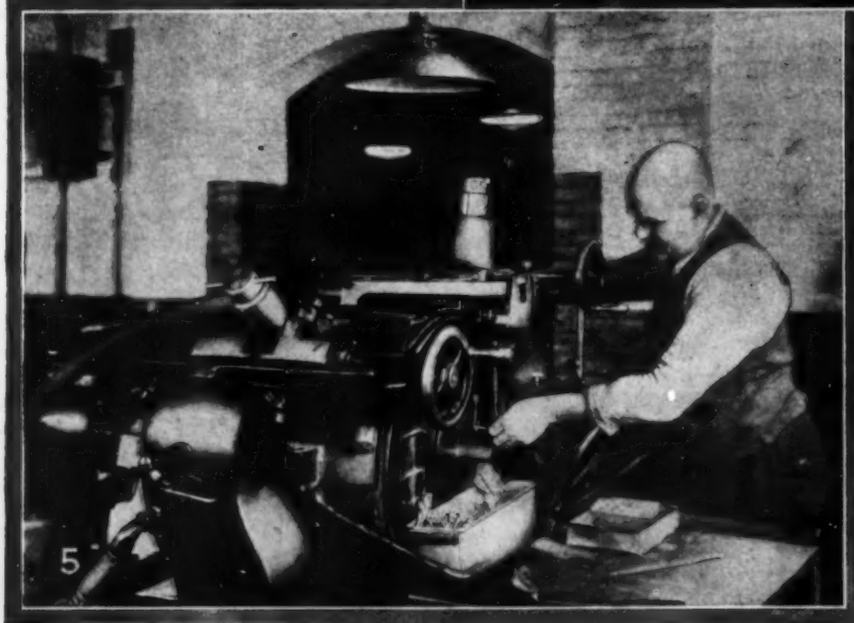


Fig. 4—Inspection of wire-size drills for straightness

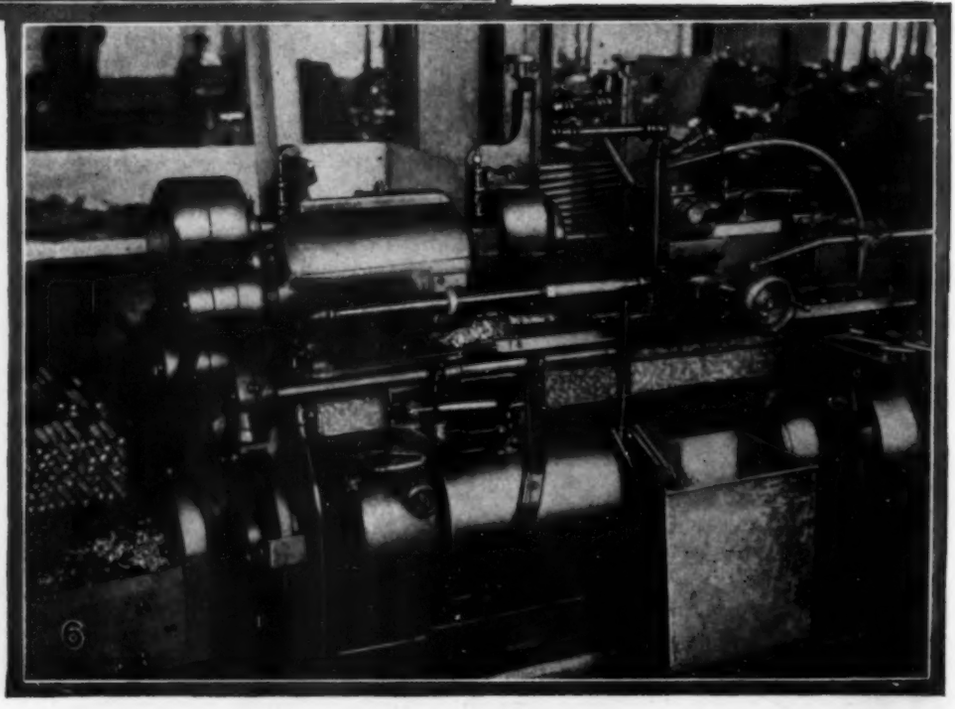


Fig. 5—Grinding diameter of small drills on Cincinnati centerless grinding machine

Fig. 6—Turning drill blanks in Pratt & Whitney automatic engine lathe

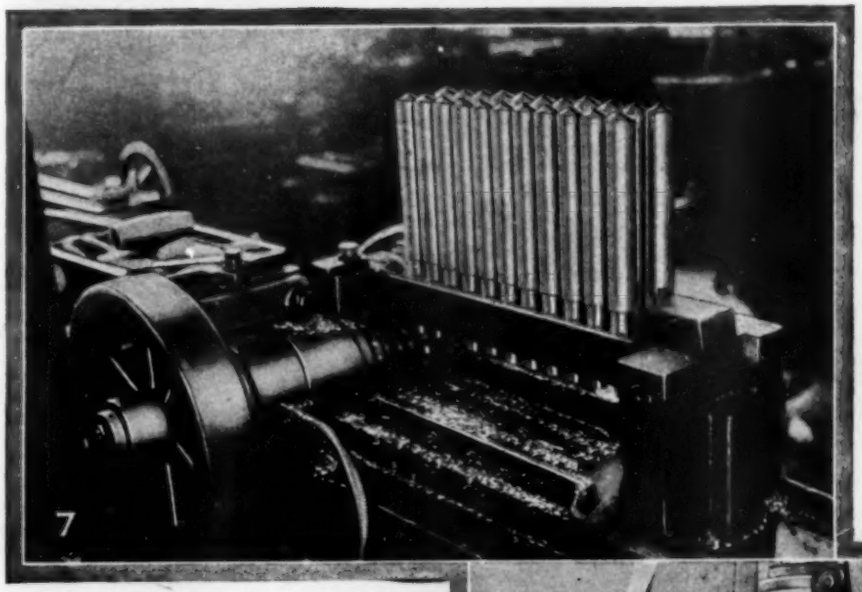


Fig. 7—For milling the tangs on taper-shank drills, the drills are "ganged" in the bridge fixture, as shown. A light tap of the hammer is all that is necessary to tighten the drills in the fixture

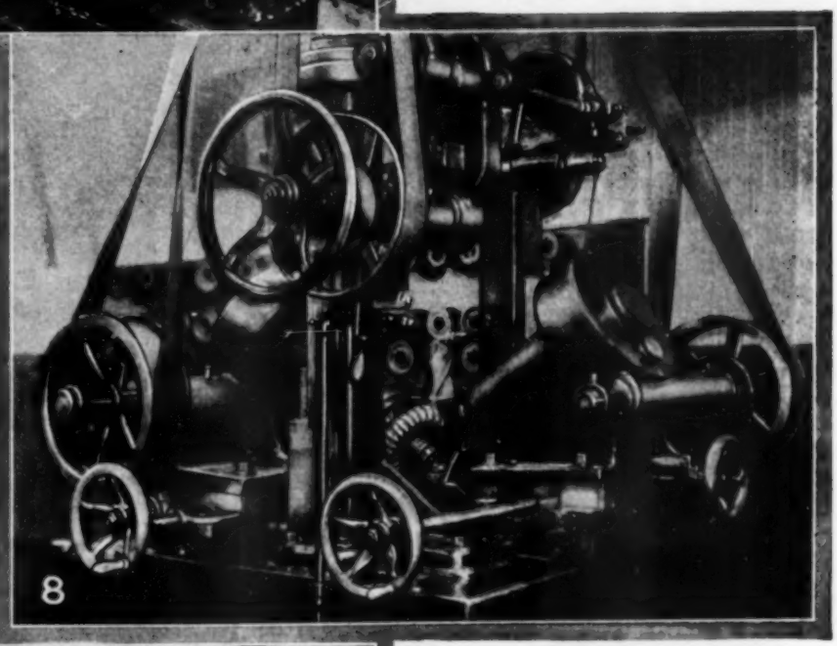


Fig. 8—The flutes of large drills are milled in special, automatic machines. Two cutters are used, one on each side of the drill. The thrust of one cutter is balanced by that of the other

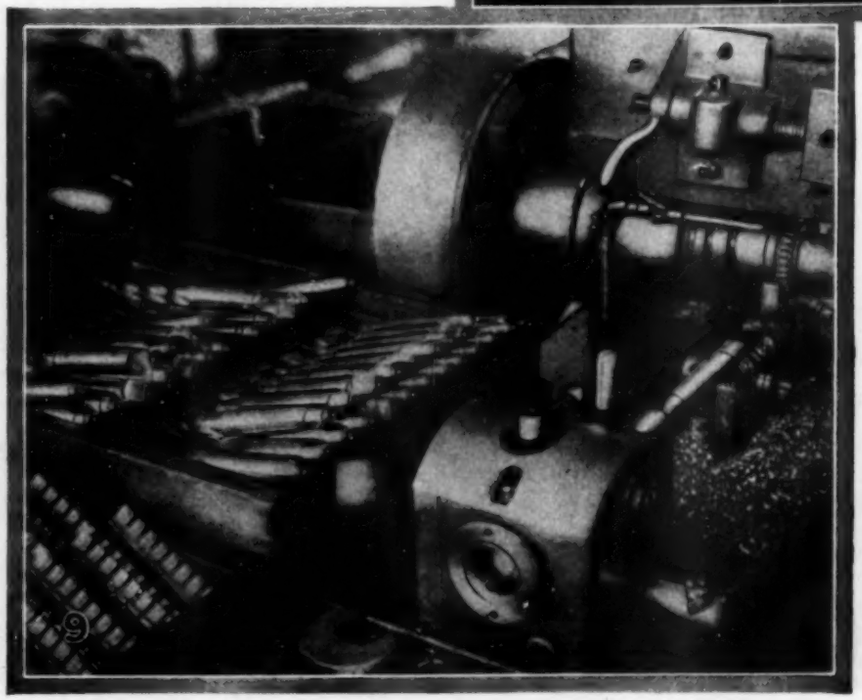
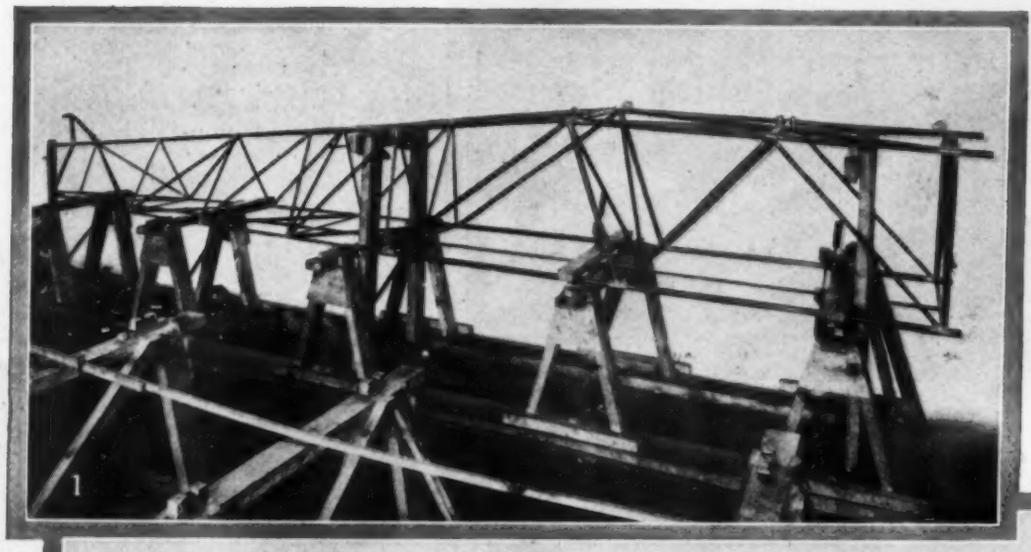
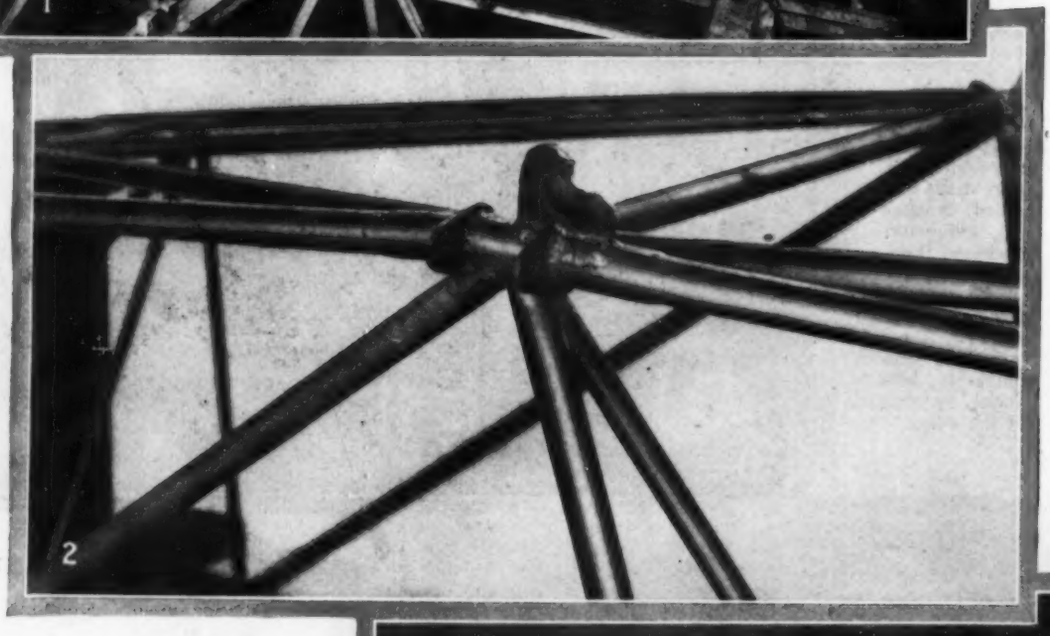


Fig. 9—Drills must be given circumferential clearance or relief. This picture shows the relieving operation on drills of comparatively large size

The Fuselage of the Meteor Plane

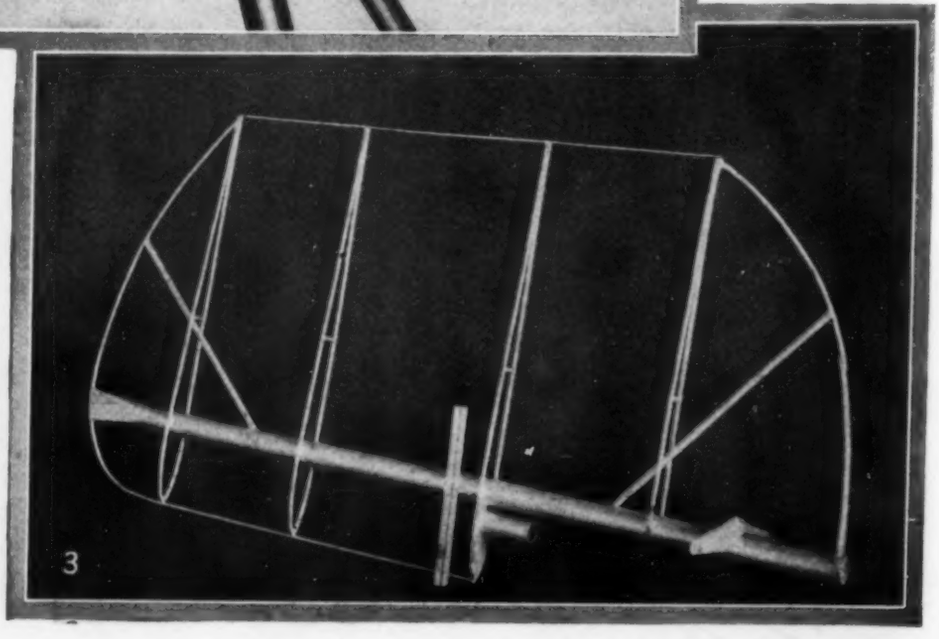


1—Jigs with steel fuselage in place. All joints welded in this position. Cutting, fitting and welding, 70-75 man hr. Alignment maintained within 1/64th in. during welding operation



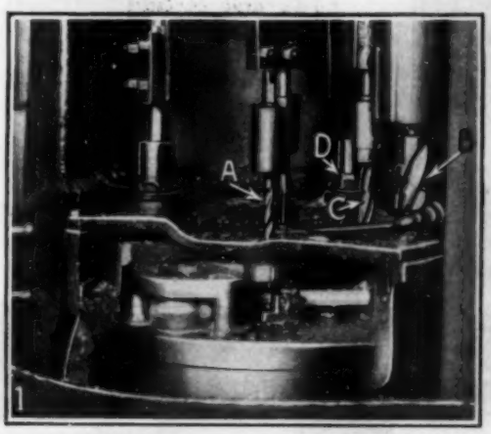
Photographs by courtesy of the Ireland Aircraft Co., Garden City, L. I.

2—Rear wing hinge and socket of landing-gear fitting. Difficult weld owing to tube being 0.035 and plate ¼-in. thick and eight members coming into one joint. Welding done by skillful woman operator



3—Rudder assembly. Entirely of steel. Total labor about 7 man hr. Protected with aluminum enamel. All welding with oxy-acetylene torch

Automotive Production



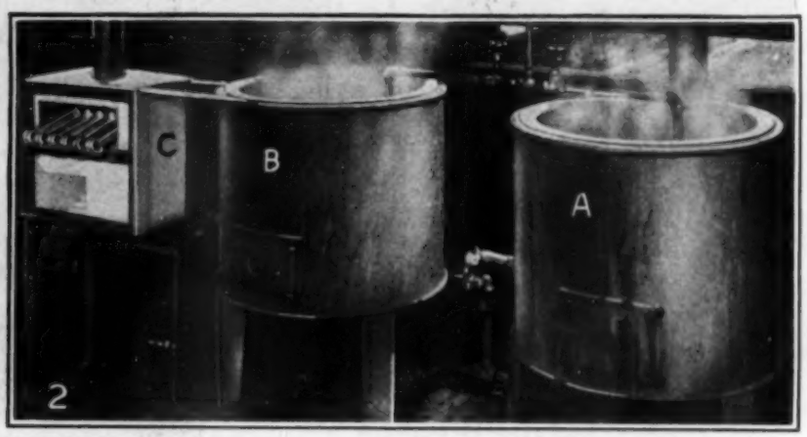


Fig. 1—Rough and finish drilling in special machine. Fig. 2—Washing and rinsing tank and electric drying furnace

Duralumin Connecting-Rod Machining Methods

By Fred H. Colvin
Editor, American Machinist

Rough drilling and reaming the small end — Elongating the large end—Casting the linings in a centrifugal machine—Grinding ends of bearings—Sawing off the cap

FRANKLIN connecting rods are of duralumin and are machined in a very compact line-up of machines arranged for progressive production. The first operation is to drill both ends in the special machine, Fig. 1, the rods being loaded in front and nested in a tangential position to economize space in table diameter.

The holes are rough drilled by drills *A* and *B*, while the small end is further finished by drill *C* and reamer *D*. To allow for the metal removed in sawing off the rod caps, the hole is made oblong by having two cutters for that operation and so arranged off center, that each one bores from opposite sides of the rod. This secures the necessary elongation in a very simple manner, it being necessary only to guide the boring bar properly during the one-sided cut.

After chamfering both sides of the large ends the rods pass to the group of equipment in Fig. 2 where they are cleaned in a hot solution at *A*, rinsed in clear water at *B*, also hot, and dried in the electric oven *C*. When dry, the rods are tinned in the furnace *A*, Fig. 3. The temperature is checked by the pyrometer shown at the right, while the revolving wire brush *B*, is used to insure an even distribution of the metal inside the bore.

Next in line is the spinning machine in which the bearing is cast, the babbitt furnace being at the left. Casting the babbitt in the rod is credited with the advantage of securing a better contact between the bearing and the rod than where a separate bearing shell is used, and thereby getting a more rapid distribution of the heat generated in the bearing.

A Blanchard grinder is next in line where both sides of the rods are ground as in Fig. 4 Bolt holes and the holes for the piston-pin clamping screws are drilled next and the rods then go to be sawed on a special fixture mounted on a knee type milling machine, Fig. 5. The fixture carries four batches of six rods each, in sets of three. One section is empty to show the studs on which the rods are held. In this operation the bolt bosses are faced and the caps are separated at the same pass. It is necessary to turn the rods over to machine the second side. The fixture is indexed automatically after the return stroke, by a very simple ratchet device at the rear.

Another group of machines in the connecting-rod line-

Automotive Production

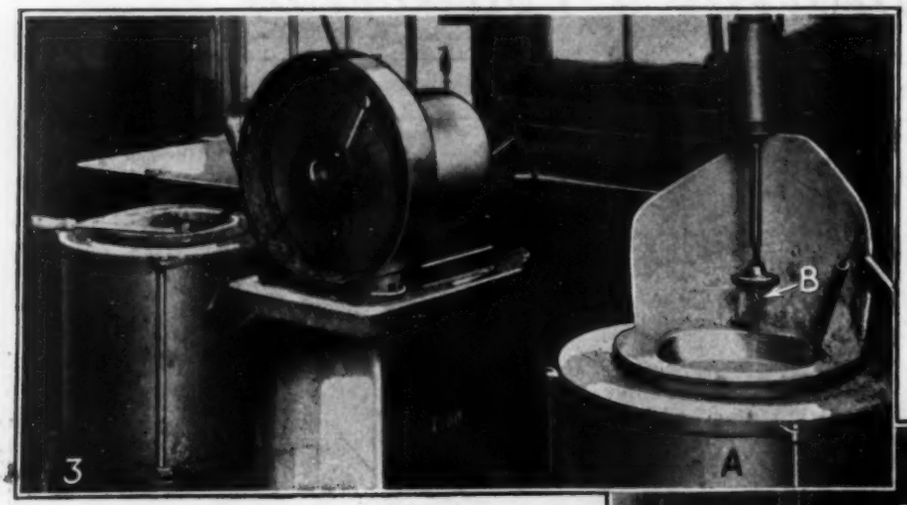


Fig. 3—Tinning rods and casting the bearing

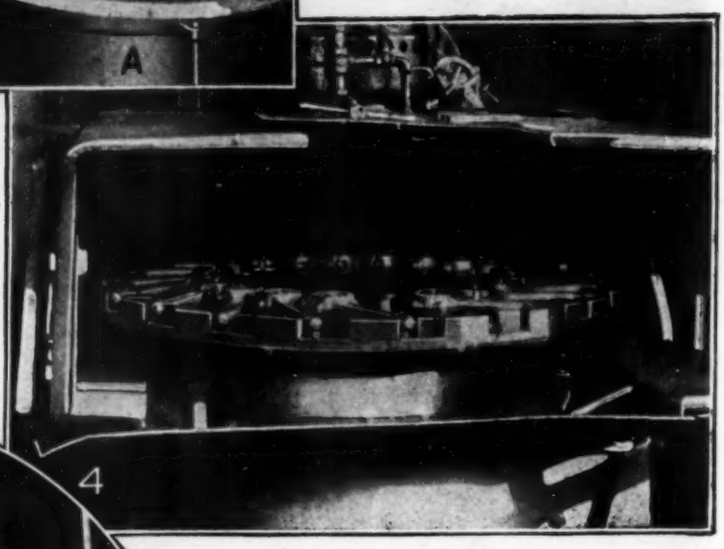


Fig. 4—Rods nested on table for the grinding operation

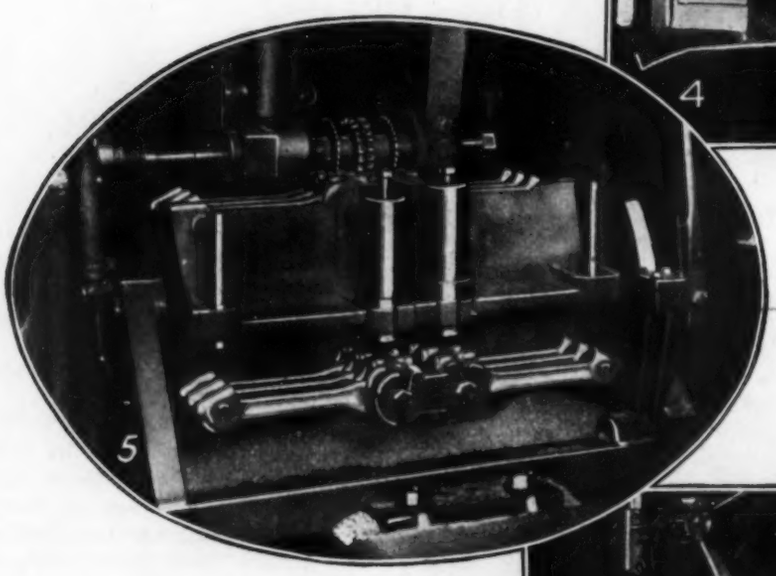
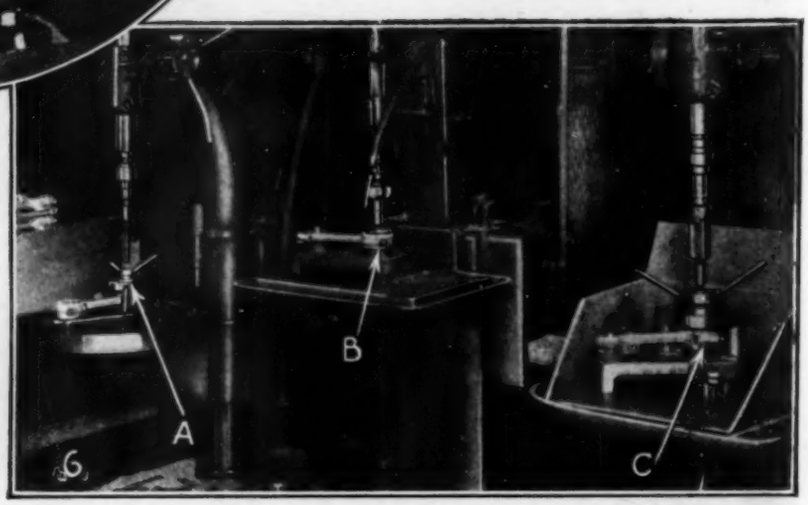


Fig. 5—Fixture for facing bolt bosses and parting the caps

Fig. 6 — Reaming piston-pin holes and chamfering crankpin holes



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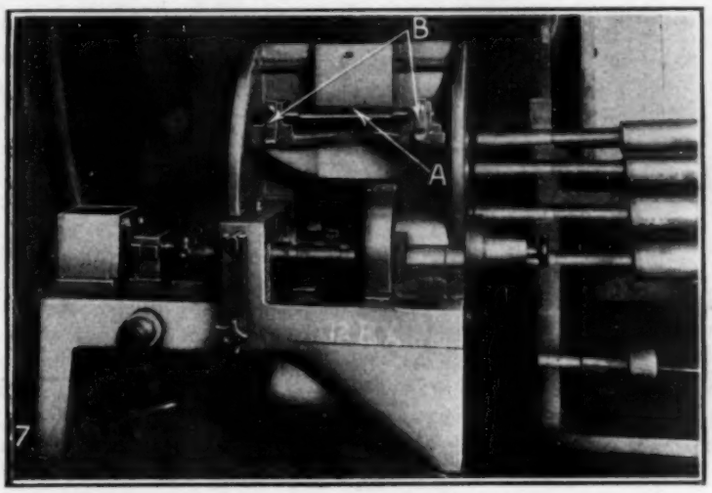


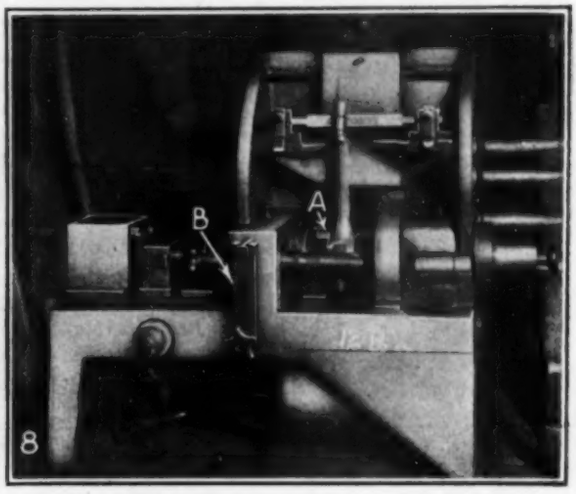


Fig. 7—Final boring machine built specially for this work. Fig. 8—Machine with rod in place

up is seen in Fig. 6. At the left, the piston pin hole is being finish reamed at *A*, the left-hand spiral reamer being guided at both ends. Next, at *B*, the large bearing is being chamfered with a tool piloted in the stud that centers the large bearing. The boring of the assembled rod and cap is done at *C*, where the center distance is secured by locating the rod from the piston-pin hole, while the large end is located by a cored bushing.

Final boring, however, is done in a special bench machine beside the connecting rod assembly line, where each rod is bored to suit the particular crankpin to which it is assigned. The guide bar *A*, Fig. 7, is removed by lifting the spring latches *B*, inserted in the piston-pin hole and the rod is placed in the machine as in Fig. 8. It will be noted that the rod is guided sidewise by the fingers *A* bearing against the sides of the large end. These fingers are controlled by the lever *B* for side adjustment. The rod is thus held without stresses of any sort and is ready for the final boring with a fly tool in one of the bars shown. The bar is driven from the right through simple gearing by the small motor beneath the base, the feed being controlled by the mechanism at the left. The bars at the right show that provision has been made for several sizes of pins, in order to secure just the right amount of oil-film space.

Details of the rod boring machine are shown in Fig. 9. The boring bar *A* carries a through, or double ended key, *B* that is driven by suitable keyways in the sleeve *C*. The sleeve, in turn, is driven through the gear *D*.

The feed bar *E* has a fine thread at *H*. The feed bar is attached to the boring bar by a bayonet lock at *I*. A split feed-nut, controlled by the slide at the left, engages the feed screw and feeds the bar through the connecting rod. Then the bayonet joint is unlocked, the boring bar is pulled out, the connecting rod is removed and the machine is ready for the next rod.

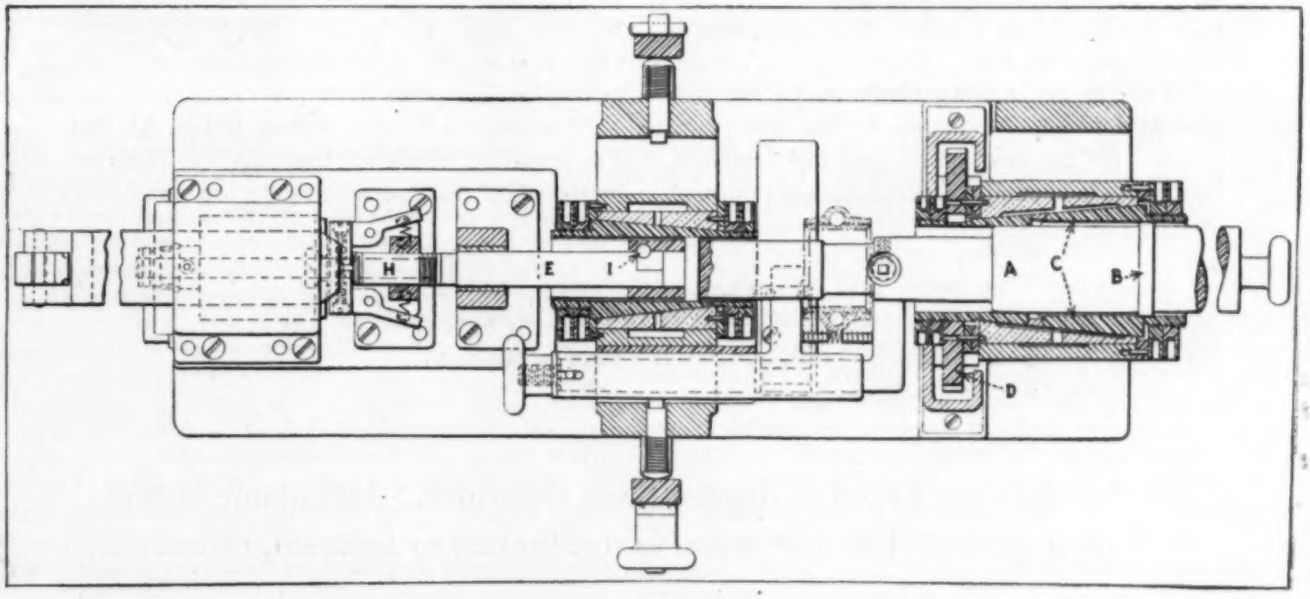


Fig. 9—Details of special rod boring machine

THE · FOREMAN'S · ROUND · TABLE

Hiring Back the Fired Workman

The following narrative is a "case" presentation of the topic. It has been written to involve some of the questions that arise in the average shop. For guidance in preparing discussion the questions at the foot of the page have been prepared

"GOSH, Al! Have you gone loony? What's the idea in hiring back Grogan when you fired him about a year ago? Is your forgettery better than your memory, or did you make a mistake then that you now want to advertise to the boys and the Super?"

"Neither, Ed. It's just cold business, plus a little personal sentiment that distinguishes men from machines.

"You see, Grogan was fired last year because he was getting too obstreperous. He was the best toolmaker in the plant, but the trouble was he was like a peacock in a barnyard. Wanted his pick of the work, and didn't give a hang about schedules nor rush jobs that didn't suit him. A talking to didn't seem to do him any good, so for the sake of discipline I asked the employment office to let him out.

"Well, to cut a long story short, Grogan has worked in two places in the last year, and has cut off most of his gay tail feathers. His family's been after him, too, and trimmed some of his sail. He has been wanting to get back ever since he left."

"Yes, but Al, won't the men begin to think they can get away with anything, and then get back into favor when they feel like it?"

"Nix, Ed, Grogan is swallowing a big dose of humble pie. Everyone in the shop knows the details. He's been admitting to a lot of them for months that he made an ass of himself and wanted to get back. Said he didn't know a good place to work when he had one. Finally he screwed up courage enough to come and see me at the shop. So I got him his old job back.

"Seems to me that a man can repent and do better in the shop as well as he can in a church. Thought it was worth a try, anyway. Grogan's the best all around tool man we ever had; knows the company product, too. If it works, the company gains as much as he does."

"Sounds like Sunday School to me, Al, and I'm awfully afraid of these Willie theories in the shop till I've seen 'em work out."

Was Al too soft hearted?
Can a discharged workman be brought back safely?
Have ethics and sentiment a place in the shop?

All foremen are urged to discuss these questions. Acceptable letters will be paid for. The discussion is not limited to foremen, of course

Discussion of Earlier Topics

Taking Care of the Old Men

AS THE superintendent of a 24-pit locomotive repair shop I have always found work of a nature that old men could perform with equal, if not greater, satisfaction than many of the younger mechanics could or would do it.

Among others, we have three mechanics, two machinists and one blacksmith, working every day, who are 77, 74, and 72 years old respectively. Machinist *A*, age 77, is now an expert on airbrake work, and as such work is always under close test, we consider it was a good move to take him off heavy work. While not working piece-work, the cost of his work, unknown to him, has frequently been compared with prices paid for similar work being done on bonus systems, and found to compare very favorably with those prices. Machinist *B*, age 74, was removed from heavy work 12 years ago, and put repairing cab mountings. Whenever he is off on vacation, his much younger successors are glad when he returns as they find they are obliged to keep busy keeping up Old Bill's work, and are none too willing to assume Bill's duties. Yet he is one of the happiest men in the shop! Heavy forgeman *C*, age 72, who runs the largest steam hammer and heavy forge in the smith shop on such work as locomotive main side rods, axles and drawbars, turns out work so close to size that it requires but a minimum of machining, and is the marvel of all the machinists. Whenever he has taken a vacation, none in this large plant were found whose work could even approach old August's for nicety and precision, and the amount per day never once compared with the old man's output. So that's how segregation works in one average shop! —WM. BROWN, *Shop Supt.*

Shop Visiting for the Foreman

IF A FOREMAN is to do himself justice he must always be aiming to acquire new knowledge. It is not sufficient for him to say that his shop is running well, or that the management is quite satisfied with his turnout. As soon as a foreman leans on that idea, then he starts to go back, and it will not be long before the management will apprise him of the fact, and start looking for another foreman.

Given the opportunity of visiting other shops, I can conceive the foreman returning with new inspiration. An idea among many foremen is that they should never be away from their business; that to be absent would be detrimental to the shop. A temporary absence by the foreman should make no difference; in fact, I venture to assert that it would be a good thing to be away sometimes, as it gives the workers an opportunity to shine. If I were asked what is the first duty of a foreman I should reply that it is to organize his labor and tools so that production can be achieved in the simplest, best and quickest time, with due consideration for his workers. —GEORGE VICKERY, *Foreman, England.*

Advantages of Foremen's Clubs

I HAD the pleasure and profit of belonging to a foreman's club several years ago. My experience there was so interesting that I regret that there isn't any in the place where I am now a resident. At first in the club we were inclined to devote our activity to becoming better acquainted socially, and out of a feeling of loyalty to boost our own organization pretty much in our informal discussions. As we became better acquainted and more strongly organized, the meetings became more practical. We ran a long series of discussions on the operations and machines encountered in the average machine shop, taking up one operation at a time. Instead of having a speaker, we had a discussion leader. It was his function to ask the questions and lead out the discussion, changing to a new question as the discussion on the old one began to wane. Having a discussion leader not only led to a free participation by everyone, but made it easier for the particular man in charge of that day's meeting. Incidentally, I believe it was better training for the men, for in the average manufacturing organization, when questions of policy are being decided, it is customary for the general officers to have the foreman stand by to give such practical information as is an aid to the subject under discussion. Knowing how and when to inject this information is important, and what better training can a man get than this learning how to keep a discussion alive in the foreman's club? After the mechanical operations were pretty well exhausted, we took up personnel problems with equal success.

JOHN L. STARR.

Do We Buy Labor or Production?

BY PAYING wages that are equal to, or above, the regular scale, a company can have the choice of the best men in the locality. Low wages do not mean low costs, but do mean dissatisfied workmen and high turnover of labor, and consequently high production costs. When a man knows he is getting better pay where he is than he can get anywhere else he is going to be more loyal to his employer. This attitude will be evident in higher production and lower costs.

—THOMAS M. GAREY, *Foreman.*

THE · NEXT · TOPIC

Paying the All-Around Man

QUESTIONS

Was Al right in asking for a raise for Charlie Miller?

Were his reasons sound?

Isn't it worth more than an average day rate to be able to keep production moving?

How Do Mutual Aid Societies Help?

MUTUAL aid societies help the individual. Men who are assessed, but never draw benefits, get to like the society when they see that the money helps their neighbors, and so become self-taught to be neighborly. And when a member gets ill and receives benefits it appeals to his self-respect to see that the money paid him is not a gratuity wrung from unwilling comrades.

Then, the mutual idea is valuable to employees as a whole, for when all hands from manager to the lowest paid man are eligible to belong to the same organization it makes for good fellowship, and the insurance feature is equalled in value by the fraternal feeling created. If once in a while the members get together in groups for a "feed" or an entertainment it further increases the friendly spirit. My connection of some 20 years with such an association in the humble capacity of secretary leads me to say that they are O.K. from a self-interest stand, and as an industrial asset. —D. M. McKILLOP.

A SIMILAR case to that of Tony's arose in a shop where I worked. After the hat was passed "Tony" felt hurt and refused the money. However, it turned out to be the best thing that could have happened, for we formed a mutual aid society, and took the money collected for Tony as the start of the treasury.

Membership was voluntary, each man paid 25 cents entrance fee and 25 cents a week dues. The officers were president, secretary, and treasurer, who also constituted the sick and relief committee. The benefits were $10 a week starting the first payday missed and continuing until the member received pay. In case of death $100 was paid.

At the end of the year the balance, less the original fund, was divided among the members. The books were audited the first year by a committee of foremen selected by the superintendent and later by the accounting department of the firm.

This plan worked successfully, and the relief lost the bad taste that charity is so apt to leave.

—ERIC HAWTHORNTHWAITE.

MUTUAL aid societies, properly conducted, would be a great help to many men. In our shop we have an organization that is all right so far as it goes, but it does not cover the many cases that it should embrace. Joining is voluntary. The officers are elected by ballot and they serve without pay. The company deducts 50 cents per month from each member's wages, handles the money, and pays the benefits. These are $5 per week in case of sickness or accident and $200 in the event of death. The sick benefits do not start until a member is out for two weeks.

The ideal mutual aid society would pay benefits of at least $20 per week, after three days of lost time, and would pay all doctor bills of the member. This would mean a lot, and the cost would not be prohibitive. The time lost does not matter so much to an hourly worker as the extra burden of the doctor's bill.

Connected with a plant near ours that employs about 500 men they have a hospital building, employ two doctors, four or five nurses, including a welfare nurse to go to employees' homes, and a dentist to look after the workers' teeth. At the end of a year's employment this company gives each employee an insurance policy for $500 and at the end of two years this amount is increased by a like amount. In addition to this they supply accident and health insurance and also life insurance at reduced cost.

Surely, if one company can do this for its employees, other companies can do something, even if on a smaller scale. A little help, when it is needed, means a lot to the average worker. —WALTER E. SHANNON.

Getting to the Big Boss

WITHOUT a doubt there is a workable plan for men to get grievances past the foreman, or past the super if necessary. There should be a committee to meet every week or two weeks, so that any man who has a grievance can present his case. If it has any merits the committee should take the matter up with his foreman, the superintendent, or the manager.

—WALTER E. SHANNON.

GRANTING the desirability of a workman meeting the big boss, which is not universally conceded, the problem of meeting any man who has no desire to meet you is complicated. Most of such men have only two ears, one of which is glued to a telephone. Subterfuge will not do because the object of one meeting is more meetings. Luck is too slow. The following methods are ethically sound and will work: 1. Find or develop a mutual friend who will introduce you and say a good word. 2. Do something that will bring your name in print where he will see it. 3. Take out a patent on something in which he is interested. He will see you out of curiosity. 4. Do your own job so well that it excites comment among your immediate superiors. The last is so novel that it is probably the best.—ENTROPY.

Who Should Do the Discharging?

WHY should Ed care whether or not he can fire his men into the street so long as he has the option of removing the men that he considers undesirable from his own department? To most of us firing is an unpleasant duty at any time and knowing that a man has a chance of an immediate job makes the task easier and may prevent us from doing him a bad turn by keeping him in a job, for which he is unsuited, out of sympathy. This applies to discharges for unfitness to the job in hand, not for misconduct.

A temporary lathe hand whom we had employed had an offer of a more permanent job elsewhere and on quitting recommended a friend to fill his place. The man was interviewed and started on the job by the foreman, not without misgiving, because, as the foreman put it, "He doesn't appear to have been built for speed." A week later, however, the foreman, referring to the same operator, said, "That lathe-hand seems to fairly eat the work and does a good job too." Following his usual custom the secretary of the company had written to the man's previous employer for character and ability references. The reply was, "He worked for us for about twelve months, but he was not very good at his job so we *got another stoker* for the furnace and laid him off."

He now has a steady job and this reference does not appear in his record. —ALBERT GUYLER, England.

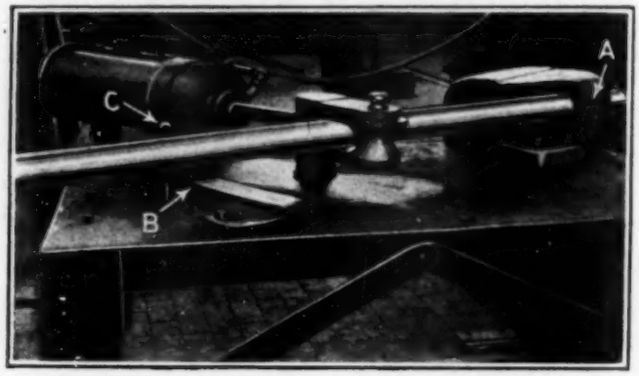
Ideas from Practical Men

The department, "Ideas from Practical Men," is devoted to the exchange of information on methods useful to the machinery industries. Its scope includes all divisions of the metal-working industry, from drafting room to shipping platform. Descriptions of methods or devices that have proved their value are carefully considered, and those published are paid for. The rates are from five dollars upward, according to their merit

Air-Operated Tube Bender

BY GEORGE H. FELTNER

Arch tubes for built-in combustion chambers are curved so that they can be connected properly between the firebox throat sheet and the bottom sheet of the combustion chamber. The diameter of the tube and the angle of the bend vary, that of the last mentioned usually being less than 45 deg. In making the forming machine illustrated, these factors were considered so that all sizes of work are handled in one machine. A double-acting air-cylinder, having a piston 8 in. in diameter and a 30-in. stroke, furnishes the power.



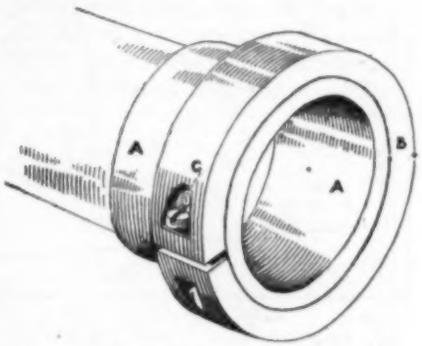
Air-operated device for forming arch tubes

The table, measuring 3½x5½ ft., is constructed of wood and has a ½-in. boiler plate top. Two detachable forming blocks, such as that shown at *A*, are required to accommodate tubes of different diameters. The blocks, held by two pins passing through them and into the table, are reversible so that each block is adapted to two sizes of tubes. The end of the tube to be formed is inserted into the block a distance sufficient to correspond with the desired location of the bend. The opposite end rests on the strap *B*. A forming roll, connected to the piston rod of the air cylinder, draws the projecting end of the tube, thus completing the bend. Limitation of the bend is controlled by the stop *C* positioned in one of the holes in the strap.

Solid Collets for Grinding

BY HENRY E. FRANCIS

Collets for any purpose are usually split in the time honored fashion. And where much adjustment is necessary, this is unavoidable. But with split collets there is always the question of accuracy, particularly in the case of collets having but one slot and closed by a collar. The distortion is inevitable and a perfect bearing on the work is not at all likely. The collet shown in the illustration apparently obviates this difficulty. It was for grinding bushings that were held to a very close tolerance. The body *A* is of cast iron, with a wall of perhaps ¼ or ⅜ in. in thickness, and with no split, as can be seen. On the outside is a split steel collar *B*, a close fit on the body. The work to be ground is also a close fit in the collet. By tightening the screw *C* with an ordinary screwdriver, the collet body is compressed enough to hold the work tight enough for grinding, and since the collet is compressed on all sides, there is no appreciable distortion and the result is very gratifying as to accuracy. For large production, the collet body would probably be made of low carbon steel and carbonized. It could be made thinner if necessary, if it did not compress sufficiently to hold the work.



A solid collet for grinding

Templet for Cam-Roller Center Path

BY HENRY SIMON

In the design of thread lobes for B. & S. automatic screw machines, the most laborious operation is the drawing of the arcs representing the path of the cam-lever roller. This construction involves, first, the drawing of the cam-lever center circle; second, the division of this circle corresponding with the divisions on the periphery of the cam over the area to be occupied by the lobe; and lastly, the drawing of the arcs themselves. Although cam templets for the Nos. 4 and 6 machines show the path of the cam roller center, there exists no such provision on the templets for the much more commonly used smaller machines, for the reason that there is no room. Hence they must ordinarily be laid out by hand.

In Fig. 1 is shown a templet that can easily be made. It contains the cam roller path for all three sizes of smaller machines, in addition to straightedges for drawing the radial lines required for ordinary lobes. As will be noted, the path of the roller center is represented

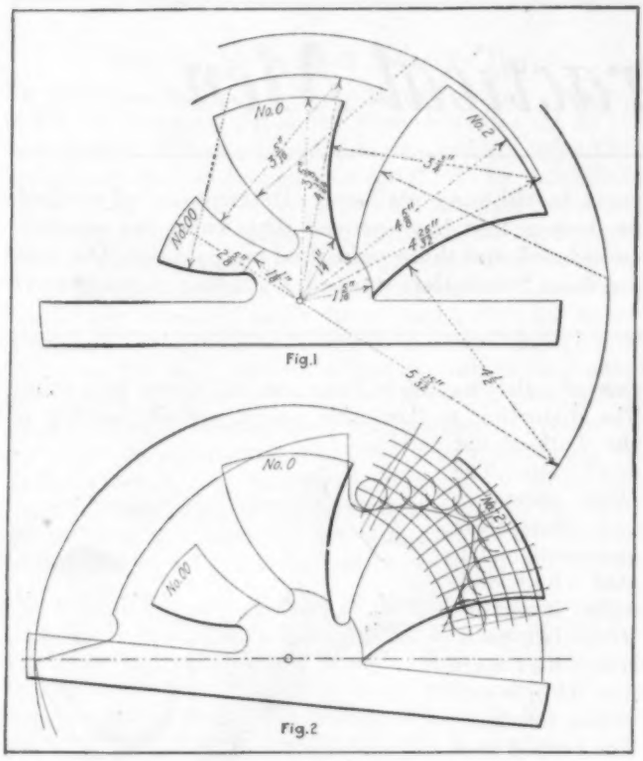


Fig. 1—Templet for cam roller center path. Fig. 2—Application of the templet

for each size of machine on one lobe in its male and female shape, and there are also two lobes for drawing radius lines. In this way, the draftsman is enabled to draw the arcs in any position and still have the light from the right side, or in other words, to have the light shining against the edge being used, so that rapid and accurate work is always possible, even in a poorly lighted drafting room.

The templet is made of sheet celluloid about $\frac{3}{64}$ in. in thickness by the following procedure, which of course will be equally useful for any similar articles: First, the drawing of Fig. 1 is laid out on paper according to the dimensions given. Next, the sheet celluloid is firmly tacked in place over the drawing. With a pair of well-pointed machinists' dividers, the outline of the templet is carefully scratched on the celluloid, three or four light cuts being taken for each arc. The scratch marks are deepened with a small and very sharp penknife, and the centers of the small corner circles, as at A, transferred through the celluloid to the other side by means of a draftsman's divider point. The templet is now removed, turned over, and the corner circles repeated on the opposite side. By bending the celluloid along the scored lines, it will break clean, and only a few light touches with a fine file may be required to finish it. For both accuracy and neatness, it is necessary to leave the arcs smooth and without flats.

With this templet the work of laying out the arcs is reduced to about one-tenth. This saving in time is not the only advantage, for because of the absence of all auxiliary marks, the drawing is kept in better shape, and mistakes, such as are apt to occur in choosing the wrong radial distances for the cam-lever center and cam-roller center circles, are avoided for all times.

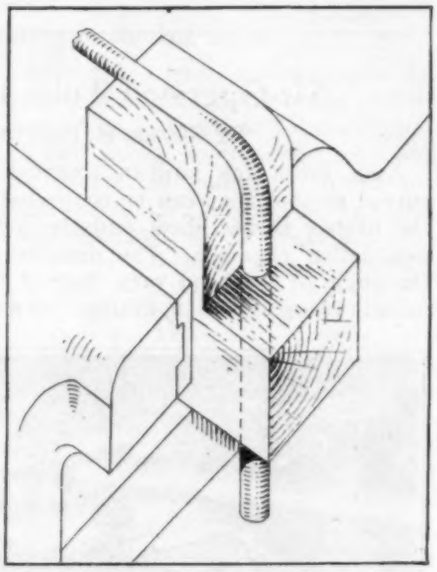
In Fig. 2, a typical application of this templet to a cam layout for a No. 2 machine is shown.

Handy Block for Bending Small Tubing

By H. L. Wheeler

In fitting tubes to machines and automobiles to carry oil to the bearings, many bends are required at varying angles and degrees of curvature. To make neat-appearing bends is not easy, unless some kind of a form or bending device is employed.

Having a considerable amount of work of this kind to do, I made the bending block shown in the sketch. It is made of hard wood and is shaped to the radius of the bend to be made. A hole slightly larger than the tube to be bent is drilled in the block as shown, its purpose being to hold the straight part of the tube. A separate block is required for each size of tubing, also for bends differing greatly in radius. The hole for the tubing should be as close as possible to the part of the block where the bending is done, so as to avoid making short kinks.



Block for bending small tubing

In use, the block is generally held in the vise where it can be adjusted to any convenient angle, though if the tubing to be bent is very small it can be held in one hand while the bending is done with the other.

A Method of Checking Threads—Discussion

By L. Buzzard
London, England

On page 877, Vol. 65, of the *American Machinist*, Charles Kugler describes a method of checking chasers and taps. Apparently he selects a wire of such size that when it is placed between threads of perfect formation the tops of the wire and of the thread will lie in the same plane. Observations are then made as to the fit of the wire when it and the thread are placed together on a surface plate. Whether or not there is pitch error, or whether the threads are cut too deeply or not deeply enough, is deduced from the observation.

While the method is interesting, we feel that all should appreciate just what it will show and what it is incapable of showing.

The question of checking tools used in the production of screw threads is one that deserves careful attention. It is much better to control the tools so that we may be reasonably certain of the product turning out all right than to confine our attention to the product itself. A systematic check upon

such tools will materially reduce the amount of scrap produced by them.

In the first place one buys—or should buy—threading tools made to a specific tolerance. For instance: taps should not be purchased merely as "commercial taps" of such and such diameter and pitch; each supplier should be in position to guarantee his work to certain fixed limits, and tools that fall outside these limits should be rejected by the purchaser.

It follows that checking must be a quantitative operation. It is not sufficient to say that a tap is rather too big; it should be stated that it falls outside the permissible maximum. Thus, whatever the merits of the method described by Mr. Kugler it cannot safely be applied where large quantities of interchangeable parts are required, since no reading of the deviation from proper size can be obtained by it.

Upon giving the matter consideration it seems to be but a modification of the wire method commonly used to check the pitch or effective diameter of a screw. Actually it does not give a true indication of the conditions at that place, since the size of the wire is such as to make the points of contact fall well below the position on the thread flanks where the effective helix cuts.

It would be very easy by this method to condemn a perfectly good tool. Thus, suppose the thread form were good except that the crests of the threads were slightly truncated. This error would not matter at all, since in practice there is clearance at the top and bottom of all threads—even if it is not shown or mentioned on the charts. The removal of the crests of the threads, however, would by this method be interpreted as the thread form not being cut sufficiently deep.

Again, we are told that if the wire is loose there is either pitch error or the thread has been cut too deeply. Pitch error cannot be found by a single measurement across the threads. It may be estimated from two measurements of the effective diameter, providing these are taken at a known distance apart. In any case it assumes that the angle of the helix is known, which clearly is not the case with the method under discussion. Also, a looseness of the wire might not indicate that the threads were cut too deeply; instead the flanks might be concave or the crests too high.

Each Element Considered

In summing up we may say that the method described gives some indication of the thread condition, but just what the indication means cannot be told without further measurement. There is no quick way to measure a thread. Each element has to be checked separately.

Take the case of an even-fluted tap. If it were known that the threads were of perfect form, a single measurement taken over the top diameter would be quite sufficient to tell if the tap were correct. As it is, any commercial tap varies in many ways from standard and so we must, if we wish to get a true estimate of its worth, inspect each element in turn. Thus we have to measure separately the top, effective, and core diameters. A fair idea of the angle of the thread can be obtained only by optical projection. Measurement over the tops of two series of wires of different diameters will give a figure, but since that varies with the wires selected, it is not so reliable.

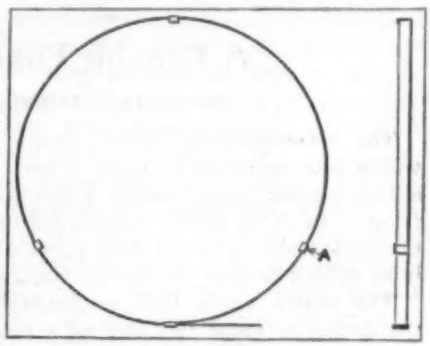
In the case of a chaser we would suggest that it be checked in the following manner: It is not as straightforward a job as an even-fluted tap, since no diametral measurements can be taken. First the chaser should be projected against a standard to see if the form is good enough. If sufficient length be included in the projection, an estimate of pitch error may also be formed. Next, the depth of the thread must be found by two measurements, one taken at the top and the other at the bottom of the thread.

If these observations show that the tool is within the specified limits it may be passed. If the chaser happens to be one of a set belonging to a self-opening die head, it will be better to assemble the set, cut a thread, and take the measurements from this.

Gaging by the Circumference

By P. H. White

The time-honored practice in measuring circular parts is, of course, to caliper across the diameter. There are some classes of work, however, where a measurement around the circumference is more satisfactory. In a certain case where a large number of disks was to be turned accurately to size, the diameter was so great as to make the use of calipers impractical, and the gaging was done by means of the specially constructed tape shown in the accompanying sketch.



Gaging diameters by the circumference

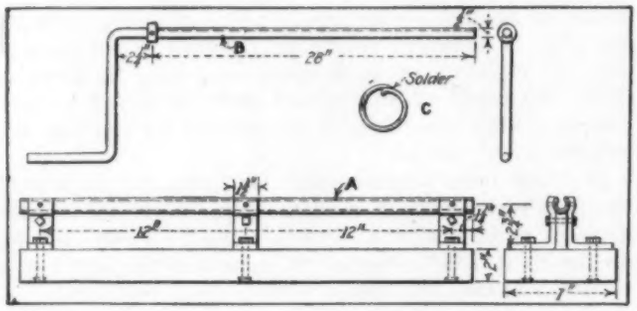
One end of the tape passes through a clip that is attached to the other end, thus forming a continuous ring. Three lugs, one of which is shown at *A*, were attached to one edge of the tape and served to hold the latter square with the face as it passed around the disk. A gage mark on the tape near the free end matched with a similar mark on the other end to show the measurement and all the disks were turned to this circumference.

Hand-Operated Tool Forms Metal Tubes

By Louis L. Locke

In the manufacture of water coolers and parts for refrigerators used in connection with railroad cars, it was necessary to make several small sheet-metal tubes varying in length from 12 to 28 in. The hand-operated former, illustrated, was developed and now handles the production required.

The device consists of a wooden base, 2x7x28 in., to which is fastened the stationary cylindrical sleeve *A*. The sleeve, supported by angle brackets as shown, is made of ½-in. pipe, split along the top face then spread so that the inside diameter measures ⅝ in. The rotating mandrel *B* is made of ½-in. drill rod, having a handle formed at one end. A saw slot, 1/32 in. in width and ¼ in. in depth, is made in the body of the mandrel, at the end of which is located a collar for the purpose of giving a correct end location to the mandrel when it is placed



Forming tool for copper tubes

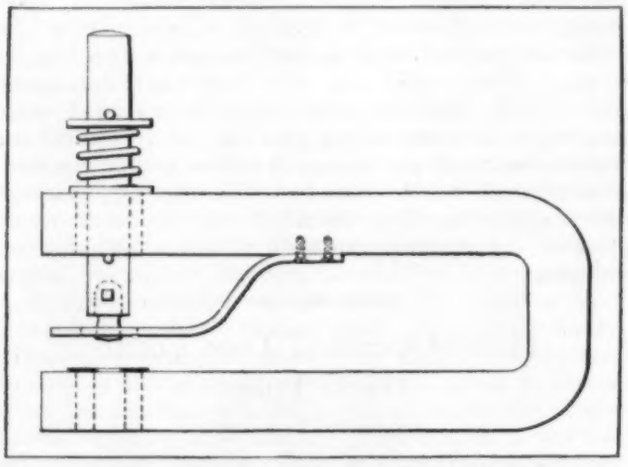
in the sleeve. The material to be formed, 28-gage copper, is cut to the proper length and width, after which one edge is inserted in the slot of the mandrel. One revolution of the mandrel forms the tube. The mandrel and the tube are withdrawn from the sleeve, then the tube is slipped off the mandrel. The seam is soldered as shown at *C*, thus completing the tube.

A Portable Punch

By John J. O'Wril

The accompanying sketch shows a portable device which was designed to make ¼ and ⅛ in. holes in the edges of some copper sheets, 7 ft. long by 3 ft. wide and from 3/32 to ⅛ in. thick, thus obviating the necessity for taking the sheets to the drill press where the holes had been drilled before the device was made.

The sketch needs little explanation. The frame of the device is made by bending a piece of steel of rectangular section to a U-shape, boring a transverse hole



Portable punch for sheet metal

clear through the adjoining ends, and fitting a suitable die and punch to the holes. The die is made in the shape of a shouldered bushing and the punch is a separate piece of tool steel set into the plunger as shown by the dotted lines.

A coil spring, confined by a cross-pin driven through the plunger above the frame, serves to withdraw the punch after the hole in the copper is pierced. A piece of heavy sheet stock, bent as shown in the sketch and attached to the frame by small screws or other suitable means, acts as a stripper. To pierce the holes in the sheets a blow is struck on the upper end of the plunger with a hammer.

Practical Shop Problems

Questions of a Practical Nature will be answered in this column

Accurate Location and Drilling of Holes

Q. How are holes accurately located and drilled in jigs by the so-called button method?

A. The center lines of the holes are first scribed on the jig surface and the centers marked by a punch prick. The holes are then drilled, but should be slightly smaller in diameter than the required finish size. The holes are then tapered and hardened steel buttons, the diameter of which should be accurately measured, are fixed to plugs that engage the drilled holes. It must be possible to displace these buttons about their fixation screws slightly so that the exact distance between any two of them can be accurately set.

The distance between the buttons is measured by a micrometer and the position of each button rectified. The jig is then placed in a lathe or a boring machine and each button is accurately centered, the button is removed, and the hole finished by means of a cutting tool. This procedure is repeated for each hole. This method is both complicated and tedious, and where there is considerable work of this character to be done, it is recommended that a modern jig-boring machine be secured as holes can then be located in a few minutes with a high degree of precision. In that case all the settings are made by the micrometer table screws.

Tools for Turning Monel Metal

Q. Will you please give me the proper grinding angles for tools for turning Monel metal?

A. The chip from Monel metal is very tough, somewhat similar to that of many alloy steels. A general rule given by the producers of the metal is to use high-speed steel tools ground with sharper cutting angles than are used ordinarily for steel. The angles for the tools are not fixed absolutely. A lathe tool with a 13-deg. clearance, 20-deg. top rake, and 9-deg. side slope is recommended for a ¼-in. cut with 3/32-in. feed at 60 ft. per min. Ample lubrication for the tool is also recommended.

Accurately Finishing Drilled Holes

Q. How can twist drill errors be corrected in accurate work?

A. Twist drills are generally subject to slight errors of grinding that result in erratic drilling, which normally can be tolerated, but which should be compensated for in accurate work such as jig drilling. It is very exasperating work to obtain the exact final diameter and concentricity of the hole by successively increasing the diameter of a boring tool as the repeated trials take considerable time and involve the danger of over-running the required diameter. The safest method is to drill the hole from 0.02 to 0.04 in. smaller than required and then replace the twist drill by an end milling cutter, the cutting edges of which rotate perfectly concentric with the taper shank. This method of finishing is both fast and accurate, assuminng, of course, that the machine itself runs true.

Comparative Testing of Taps—Discussion

By J. E. Winter
President, Winter Bros. Co.

THE article on the testing of taps by A. C. Danekind in the *American Machinist*, p. 251, Vol. 66, should be read by all tap users. It shows that a leading manufacturing organization has started to investigate the cutting action and relative value of taps, and it is to be hoped that others will get interested and try to find out if there are definite workable rules that can be applied to taps.

Some may say that the tap makers should have worked out all of the problems by this time, and be in a position to supply taps that are uniformly efficient. Many of them have done a great deal of experimental work in their own plants, and in co-operation with some of their customers, but conditions have been changing very rapidly and results seem to be so inconsistent that they have hesitated to express themselves.

Erroneous Conclusions

There is a surprising lack of knowledge about taps among tap users, and it is evident that few outside of the tap-making industry have anything but a hazy idea about the many factors affecting results, and they are very likely to draw conclusions that are far from correct. Some feature that can be distinguished by the eye is noticed on some taps and not on others, so if results differ it is natural to infer that the noticeable difference is responsible for the difference in quality or volume of production, but very often this is not so.

When drill presses are regularly used for tapping, it may be consistent to use them for tests, but a drill press is generally about the worst machine to use for tapping unless something is done to take the tapping strain off the key that drives the spindle, and apply it some distance from the center of rotation, so that there will be less pressure to resist the advance of the spindle.

There are drill presses and radial drills made to take care of this condition, but on the ordinary drill a spindle of small diameter must slide on a key that transmits the power. The operation of a tap of fair size, such as 1 in., applies a heavy pressure on one side of the key, and it must pull the spindle against a resistance which in turn makes the tap go harder, often greatly increasing the strain on the tap far beyond that required to cut the thread. Taps are often broken because of this condition when it can be demonstrated that the torque required to break the tap is several times as great as that required to cut the thread.

Taps differing in certain features not affecting results under ordinary conditions will sometimes show marked variations when tested this way. Lack of proper lubrication, or any condition causing a tap to work hard, will have noticeably worse effect than when taps carry no strain beyond that required to cut a thread.

One of the charts given by Mr. Danekind shows an easy working tap with a short life. Hardening and tempering variations are important items affecting tap life. Taps with threads backed off close to the cutting edges will work easily, but unrelieved taps will often do more work. The form of cutting edge that works the easiest is not always the one that lasts the longest.

The length of chamfer is also referred to. The long chamfer, putting less work on each thread and generating less heat at any one point, favors the life of the cutting edge, especially of carbon steel taps. The increased surface in operation increases the power required. When taps are operated in short through-holes, where increasing the length of the taper thread does not increase the length of the cutting edge in operation, increasing the length of the chamfer decreases the torque. But where the entire length of the chamfer must be cutting at one time, the power required to operate increases when the length of chamfer is more than 3 or 4 threads.

Mr. Danekind indicates that ground thread taps operate with less power than those with threads not ground. Sometimes they do, and sometimes they do not. A leading tap manufacturer recently asked me how I explained the fact that ground-thread taps work harder than unground taps, and men from a great automobile organization noted the same thing. My own opinion, based on considerable experience, is that the uniformity of ground-thread taps is frequently against them when power consumption only is considered; while the slight irregularities of unground threads, causing them to be in contact at different places on different lands, often results in easy-working taps.

The chart also showed a rapid decrease in efficiency of unground taps after tapping a small number of holes. Evidently the ground-thread taps tested were better in some way, for the grinding alone did not make all of the difference, as there have been many tests showing contrary results. The greatest production records I have seen were from taps with unground threads, but I am inclined to think ground-thread taps would do as well, possibly slightly better, if all conditions were right.

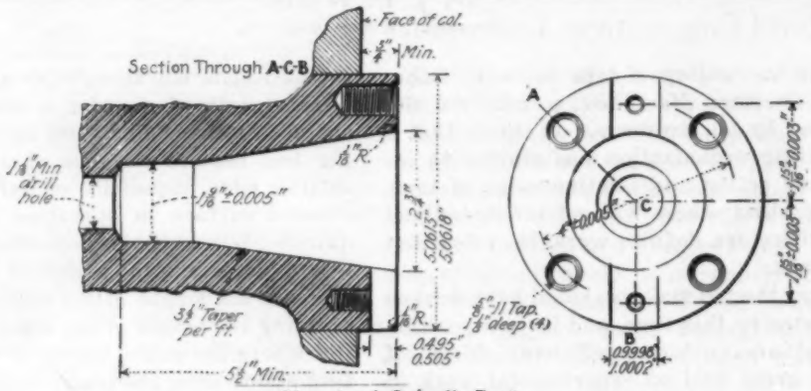
No Basis for Comparison

It is true that published facts relating to taps are few and I fear this condition will continue for some time. There are so many factors that there seems to be nothing that can be used as a basis for comparison. The tap that makes records on one job is not satisfactory on another job, or in another shop doing what seems to be the same work. Taps from a maker with a fine reputation are often badly beaten by others, and the conditions reversed again the next day. Ground-thread taps beat taps with unground threads; then unground taps make a new high record.

In most cases, the user has figures to prove his results, but unfortunately other tap users demonstrate that he was wrong. Thus far, only two items seem to have been definitely settled: High-speed taps have been demonstrated to be the best for most production jobs; and ground-thread taps are the only ones to consider for use in long holes, or where accuracy is required.

The old rule for oiling bearings used to be "a little and often." For ball bearings this rule should be modified to "a little and not too often."

Standard Spindle-End Adapters for Milling Machines



Standard Spindle End

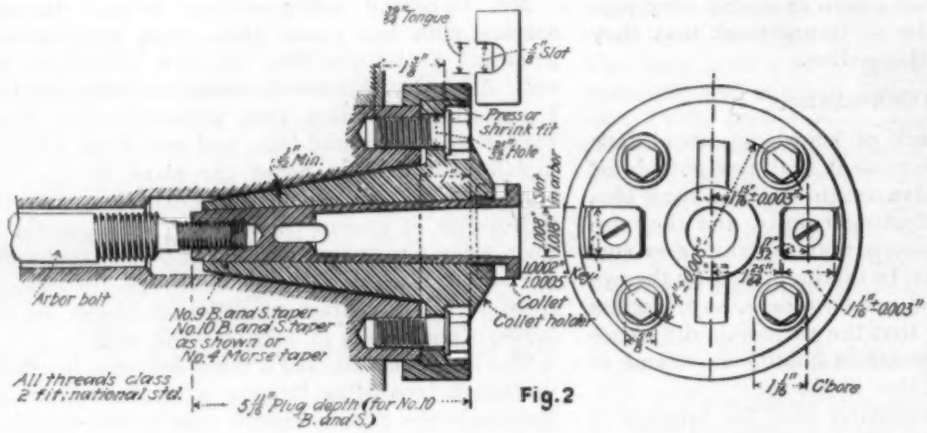


Fig.2

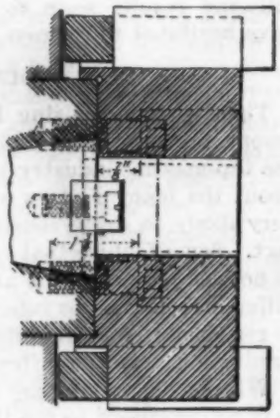


Fig.3

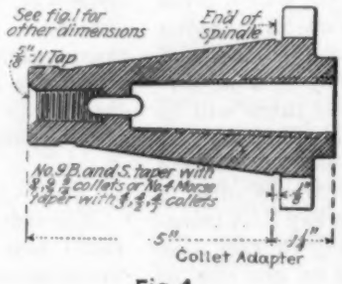

See fig.1 for other dimensions
End of spindle
⅝"-11 Tap
No.9 B. and S. taper with ⅜, ½, ⅝ collets or No.4 Morse taper with ⅜, ½, ¼ collets
5"
1¼"
Collet Adapter

Fig.4

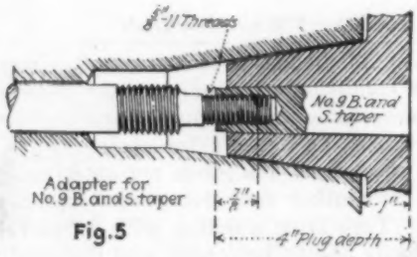


Fig.5

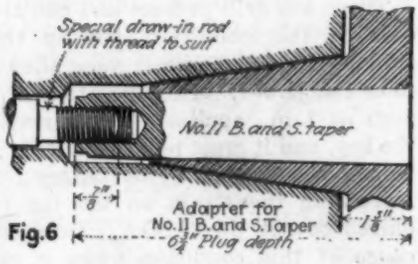


Fig.6

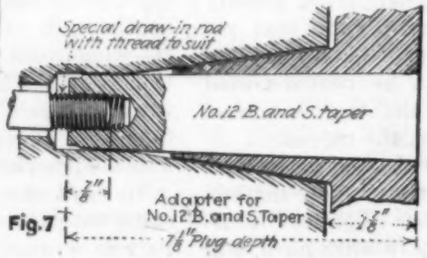


Fig.7

The adapters shown on this page are for use with the standard spindle end of milling machines that was adopted in 1927 by nine of the largest manufacturers of this type of equipment. The draw-in bolt was also standardized at the same time, as was a complete set of arbors* in three types, teated, plain and shell-end mill. This standard spindle end, the principal dimensions of which are shown in Fig. 1, is the same for all machines from 2 to 25 hp. The adapter shown in Fig. 2 registers over the outside of the spindle end and is bolted to the spindle face. It can be used for arbors, end mills, and other tools having a threaded hole for the draw-in bolt. Fig. 3 shows a face mill held to the spindle by four screws and driven by the spindle tongues, while Fig. 4 shows a collet adapter which fits directly in the spindle end and is held by the draw-in bolt. Figs. 5, 6 and 7 are for use in connection with existing arbors.

*Reference-Book Sheet No. 11—Machine Design, page 669, Vol. 66, *American Machinist*.

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Technical Abstracts

Discuss Science of Foremanship

Of course it is possible that perfection in foremanship ability may be acquired through the unscientific, haphazard, unorganized and wasteful method of trial and error. Until recently this was the method pursued by most industrial managers. However, with an added knowledge of the importance of the foreman to the industry, with the realization of the necessity of a co-operative personnel, with an added understanding of the problems of industrial competition and of the necessity for the separation and delegation of responsibility to competent persons, managers see the problem in a different light and are setting up programs to train their foremen on the job; realizing that it is just as important to teach a foreman on a high level of activity the intricacies of his position as it is to train green hands in the mill on the lower levels of performance.—B. H. Van Ott, *Abrasive Industry*, April, 1927.

Four Speed Transmission

The four speed transmission which was used to some extent on the more expensive cars in earlier days, is again attracting attention. Three such transmissions have already been announced, and at least two more are under way. In view of the increased power and flexibility of the modern automobile engine, this would seem to be unnecessary, but there are two disadvantages in the present system. If a car can ascend a 10-12 per cent grade in high gear, its engine will carry only a small fraction of its full torque load on the level at moderate speed and is frequently unpleasant to drive at high speeds. The other reason is that the greater axle ratio means a higher fuel consumption.

It is worth pointing out that the maximum possible speed is obtained with a rear axle reduction that will give a "horsepower required" curve that intersects the "engine horsepower curve" at its very peak. Many people believe that if the rear axle ratio is reduced so as to increase the torque load on the engine by approximately 30 per cent, it will be necessary to do much of the driving on the next to the highest gear. The fact is, however, that up to speeds of 35 miles per hour the engine power reserve is almost as large with the smaller as with the larger rear axle ratio. The main advantage of decreasing the rear axle ratio is that the average engine speed is much lower, securing a smoother operation and less wear and tear on the engine.

These new four speed gears are utilizing the internal gear for increasing efficiency and decreasing noise, even where only the ordinary production methods are used. The probable reasons are that the tooth action takes place in a bath of oil and that the gear web and rim also aid in deadening the noise. Among the advantages of the four speed transmission are that the low gear is lower, gear shifting is easier because of the smaller steps and the ratio between third and fourth is designed both to facilitate shifting and to make driving on third more satisfactory.—P. M. Heldt, *Automotive Industries*, April 9, 1927.

Civil Aviation in Germany

The Deutsche Luft Hansa, A. G., a combination of the old Aero Lloyd and the Junkers Co. since early 1926, is now the only German concern actually engaged in air-transport work. Other organizations are limited to cover certain districts only and their chief purpose is to develop interest in aviation. Revenue from traffic amounts to only 30 per cent of the expense, the remainder of which is shared by the government, states, communities and various corporations.

In May, 1926, the restrictions imposed on the construction of German aircraft since the war were removed, and since that time a number of multi-engined planes have replaced the 120 single-engined planes previously operated. Most of the machines are of all-metal construction and monoplanes of the cantilever-wing type are employed almost exclusively. All-metal propellers are also preferred to wood.

During the past summer, fifty-four lines connecting fifteen foreign and fifty-seven German airports were in operation, the total length of the routes amounting to 12,650 miles. Only one fatal accident occurred during the year although almost four million miles were flown and about sixty thousand passengers carried. Each passenger is automatically insured for 25,000 marks.

The main aim of the Luft Hansa is to develop international air lines covering long distances with the least number of intermediate stops. Such lines already in operation are those connecting London, Berlin and Moscow; Zurich, Munich, Vienna and Budapest; and Malmö, Copenhagen, Berlin, Prague and Vienna. It is expected that a line between Munich and Milan and one connecting with Spain will be developed. Germany feels herself in an important economic position as all important air lines on the Continent lead over her territory.—Editorial in *Engineering*, April 1, 1927.

Application of Gears and Speed Reducers on Motor Drives

Gear drives permit compact arrangement, are positive and afford a definite speed reduction. They are particularly adapted for low-speed work for which other drives may be unsuited. Gear drives have fair efficiencies, which range from 90 to 98 per cent for each gear reduction, depending on the type, the speed, the lubrication and other operating conditions. For long life and efficient operation, gear drives require good initial alignment, which must be well maintained. They also require lubrication and generally enclosure for safety, for protection against dust, and to facilitate lubrication.

The allowable ratio for a single reduction of spur gears is limited by the allowable diameter and surface speed of the gear, and by the minimum number of pinion teeth. For small motors a 10 to 1 ratio is allowable; for motors of moderate size, 8 to 1 is about the maximum ratio permissible. The motor pinion should have at least fifteen teeth, if possible, because the teeth of smaller pinions are weakened by the necessary undercutting. In determining a ratio of gearing, it is well to avoid the maximum possible ratio, as this ratio leaves no margin for future change, should it be found advisable.

The motor pinion should be located preferably on the same horizontal level and to one side of the driven gear. Bearing wear on slight errors in elevation then have little effect. It is not good practice to locate the motor pinion directly below the driven gear. Bearing wear is then likely to throw excess weight on the motor bearing.

Cast-steel gears are about 75 to 100 per cent stronger than those made of cast iron. They should be used for important work where shock or overload may be expected, or where the face of the cast-iron gear would exceed 4½-in. The cost of cast-steel gears is about 60 to 100 per cent more than for cast-iron gears of the same dimension.

Iron and steel gears ordinarily become noisy at about 800 f.p.m. linear speed, but may not be disagreeably noisy below 1,200 f.p.m., or even higher. Where it is desired to employ high surface speeds without noise, brass, fiber, rawhide or cloth pinions may be used. Brass pinions, although somewhat quieter, have shorter life than those of steel. Fiber pinions are quiet and can be used under any ordinary conditions, and many unusual conditions, except extremes of heat and moisture. Rawhide pinions are satisfactory unless subjected to extremes of heat or moisture, excessive-load fluctuations, or frequent starting, stopping and reversing. The surface speed of a rawhide pinion is limited more by rapid wear than by noise. A speed of about 2,000 f.p.m. is a fair average limit, but 2,500 to 3,000 f.p.m. may be used under favorable circumstances of attendance and lubrication, in the absence of moisture, and for intermittent service where the life of the pinion is not important. Cloth pinions are quiet, not easily affected by ordinary heat or moisture, are quite elastic and give good service when subjected to strains and shocks. The allowable surface speeds correspond to the values for rawhide.—By Gordon Fox, *Industrial Engineer*, April, 1927.

American Machinist

Editors: KENNETH H. CONDIT AND FRED H. COLVIN

Established 1877

Buying by Specification

BUYING machines and other equipment by specification is being advocated in some quarters and there is much to be said in favor of the practice. There is, however, another side to the story and one that is causing difficulty.

Specifications are a great help to all concerned when they are drawn by those who are thoroughly familiar with the duties of the device and practical enough to realize that absolute perfection is not yet on the list of commercial attainments. It is no easy matter to draw up a specification for even a simple piece of apparatus that will secure just what you need and prevent your being obliged to accept things you do not want. There are many things that cannot be specified in inches or pounds.

The great tendency of specification engineers is to specify too much—especially when they are not thoroughly familiar with a subject. Some successful buyers seem to be content with specifying very little beyond the results desired, both as to performance, upkeep and the ability to stay on the job. In lines that are being rapidly improved, detailed specifications are very apt to prevent the manufacturer from supplying his latest development. If we decide that specifications are necessary let us be sure they are right.

Politics and Industry

FEW of us realize the profound change in the relative positions of industry and politics that is taking place, not only in the United States but in Europe as well. A few years ago an election that brought the other party into power was dreaded by business men. A change at Washington was most feared, of course, but changes in state or even municipal governments sometimes had seriously disturbing effects.

Today the situation is different. Industry is so strong and has such a tremendous momentum that it carries on almost irrespective of which party is in power. One reason, undoubtedly, is that the animating spirit of the most successful corporations is a real desire to render service. The old dog-eat-dog methods that often implied a stand-in with the political machine to make possible certain shady transactions are in disrepute.

Big business has been an easy target for the yellow journalist for so many years that unthinking people believe that it and its directors make all the profits in good times and suffer the losses in bad times. They do suffer, it is true, but the employees and the stockholders suffer more because they have less in reserve and are usually ill-prepared to weather a storm. There is, therefore, a community of interest in the success of industry that makes the relatively smaller importance of politics a valuable thing to everyone.

Further proof of the existence of this change is found in the interest that is being evinced in the coming Geneva economic conference. Prominent men will serve as delegates from the participating countries and their deliberations may well be more fruitful than some of those recently conducted by the political representatives. The idea of the conference originated abroad and is evidence of the growing strength of industry in Europe. If the growth continues along right lines there is at least a fair chance that it may become powerful enough to overthrow political barriers and unite countries that have economic interests in common. It deserves careful study.

Size and Value

THE size of a device, a process or an industry bears little relation to its importance. The building of machine tools is an industry small in comparison with the industries that use them and that could not exist without machine tools. The diamond in an abrasive wheel dresser is very small, yet without it we could not have accurate form grinding.

The cutting tools used in turning, milling and other operations are small in comparison with the machine using them. Yet the change from carbon steel to high-speed steel necessitated the redesigning of all machine tools and made possible a production several times greater than before. The same is true of both special machines and methods.

Consider, as an example, the growing use of drop forgings and metal stampings, some of them requiring quite intricate dies. The production of the dies is one of the great factors in the cost of the parts produced. When made by hand they require great skill and take a long time. Exact duplication is difficult in any hand work and especially so in the case of forging and drawing dies.

Mechanical methods of reproducing desired shapes has made possible a much wider use of forgings and stampings. Dependence on hand work would have made the cost of dies prohibitive in many cases and the scarcity of real die-sinkers would have again increased the cost of dies by enabling them to demand much higher rates. Yet the building of machines for this work is a small part of the machine tool industry, itself small.

A little study of sizes and values will give us, perhaps, a better idea of the relative importance of various branches of industry.

Shop Equipment News

Badger No. 224 Double-Spindle Face Grinder

THE Badger Tool Co., Beloit, Wis., has recently developed the No. 224 double-spindle grinder for use in grinding two opposite parallel surfaces. The machine carries two cylindrical wheels, 24 in. in diameter, mounted in chucks, and each wheel is driven by 20-hp. motor connected to the spindles through flexible, sliding couplings.

The work table, on which suitable fixtures can be mounted, reciprocates in and out between the grinding wheels by means of a hydraulic system. Through the use of automatically-operated cams and valves, practically any desired motion of the table can be produced. The grinding wheel heads automatically open and close in proper relation to the cross-travel of the work table. On long cuts, gradual infeed of the heads is provided and in all cases micrometer stop screws are furnished for each head so that duplicate sizes may be obtained on production work.

Several improvements have been made in the spindle and head construction. Fig. 2 shows a disassembled view. The spindle proper is a one-piece forging, accurately turned and ground all over. Its front or inner end is carried on a tapered bronze bearing, the largest diameter of which is 4½ in. The rear or outer bearing carries a tapered sleeve, keyed and adjustably locked to the spindle. The sleeve is of the same outside size as the front end of the spindle and also revolves in tapered bronze bearings. End thrust is taken on a large hardened and ground steel thrust collar bearing against a wide flange on the inner end of the bronze bearing bushing. Play is taken up by means of adjustable collars. The spindle flange to which the cylinder wheel chuck is attached is 11 in. in diam. by 2 in. face.

The head casting, in addition to embodying the bearing housing, also serves as an oil reservoir so that a self-contained lubricating system is attained. In Fig. 2, a small circulating pump can be seen attached to the bottom of this casting about midway between the bearing ends. In operation this pump is completely submerged in oil and is driven by a gear engaging with a pinion cut in the central portion of the spindle proper. The oil is pumped to a distributing compartment through strainers and a glass sight gage in front of the head, thence through copper leads to each radial and thrust bearing.

The ends of both bearings are thoroughly sealed against leakage of oil by specially-designed labyrinth inclosures which also exclude the dirt. A strainer is attached to the side of the housing under the cover plate and, when new oil is put into the head, it must pass through this screen between the reservoir and the strainer as well as a second and finer screen between the reservoir and the pump.

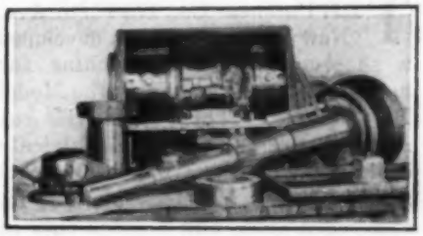


Fig. 2—The wheelhead, disassembled

A centralized lubricating system is also provided for all bearings other

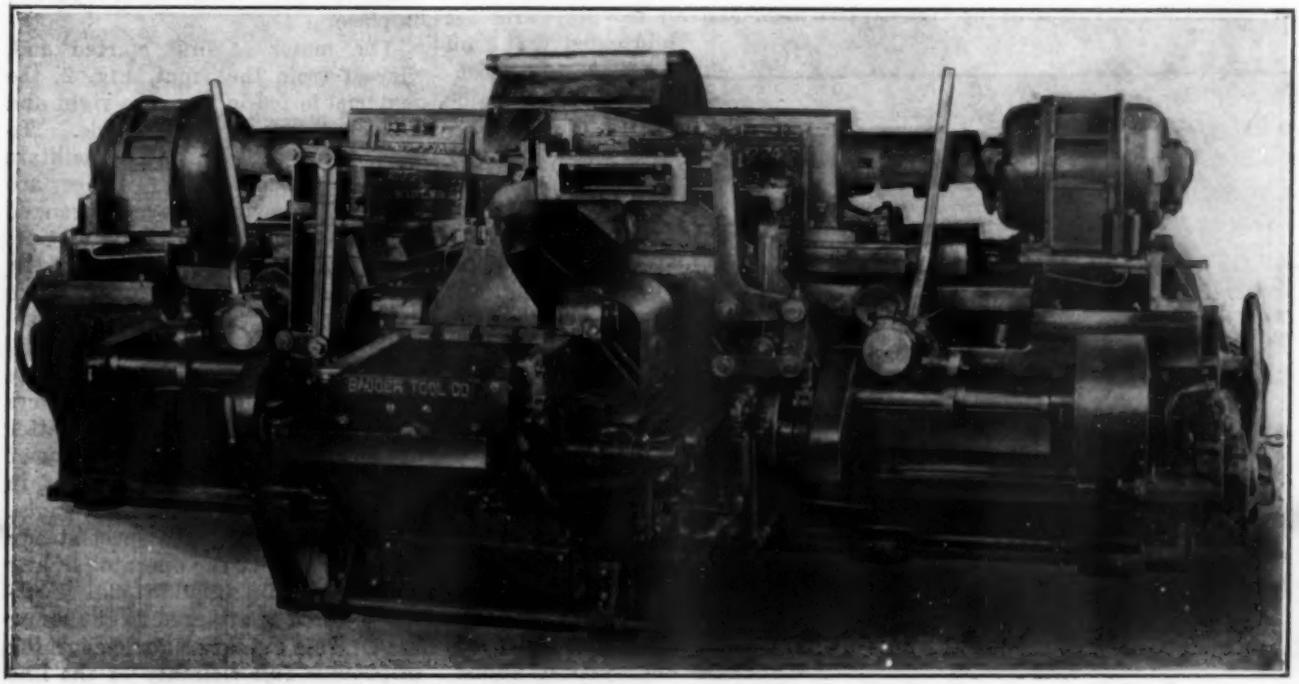


Fig. 1—Badger No. 224 Double-Spindle Face Grinder

Shop Equipment News

than the main spindle bearings just described. In Fig. 1, showing the entire machine, three pumps and plungers can be seen, one near each end and one at about the middle. A single push on the plunger effectively lubricates fourteen moving bearings at a pressure of about 1,000 lb. per sq.in. It requires but a moment to lubricate the entire machine.

In addition to the two 20-hp. motors for driving the main spindles, one 5-hp. motor is provided for operating the hydraulic pump, camshaft and wet grinding system. The machine will accommodate work with a width of 24 in. between the cylinder wheels. The entire machine occupies a space of approximately 14x6 ft. and weighs 20,000 pounds.

Model B Unishear

THE Unishear Co., 175 Fifth Ave. New York, N. Y., has developed a sheet-metal cutting machine for heavy-duty work known as the Model B Unishear. This unit will cut straight lines, curves and intricate designs on both the inside and outside on heavy flat stock up to ¼ in. cold-rolled steel, and heavier cuts in lighter material in proportion. The maximum cutting speed is 10 ft. per min., and the minimum radius 6 in. The throat has a depth of 36 in. and hence sheets up to 72 in. wide can be handled.

The frame is of sturdy construction and is made of cast steel. On its upper forward part the head unit is carried with a stationary blade, and on its lower forward part the head unit containing the oscillating rocker with its blade and driving mechanism is mounted. Both the upper and the lower head are self-contained units, bolted to the frame.

The drive shaft, which is located alongside the center rib of the frame, is supported at the rear in a self-aligning ball-bearing pillow block and is rigidly coupled at its forward end to the main shaft of the lower shear-head unit. Either belt drive to a countershaft or motor drive can be specified. In the latter case, the driving motor is mounted on a bracket bolted to the frame and is connected to the machine through an Allis-Chalmers Texrope drive. It is rated at 2 hp. The pulley for belt drive or the driven Texrope sheave is keyed to the rear end of the drive shaft, and a suitable guard is provided for covering the belt or Texrope. Push-button control is standard with all motor-driven machines. In Fig. 1 the motor-driven unit is pictured.

All revolving shafts of the shear head are mounted on tapered roller bearings, and all moving parts are lubricated with oil from a reservoir contained in the inside of the lower shear-head unit. In order to provide cleanly sheared edges without burrs, suitable adjustments are provided to obtain the correct blade setting after regrinding or changing the blades. The upper blade is attached by means of two screws to a movable piece set at an angle to the head so that the blade clearance is adjusted by moving this part up or down, and at the same time independent vertical adjustment is obtained by means of a screw and clamping bolt. All adjusting pins and screws are provided with square ends of the same size so that the same crank handle can be used for all.

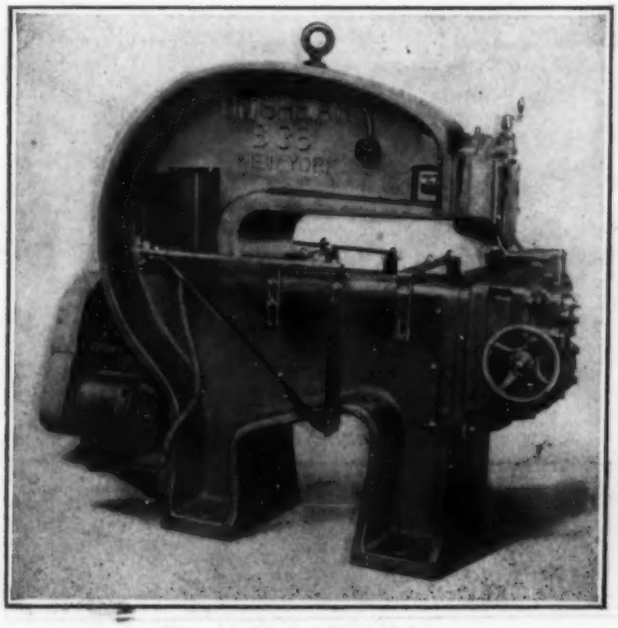


Fig. 1—Model B Unishear

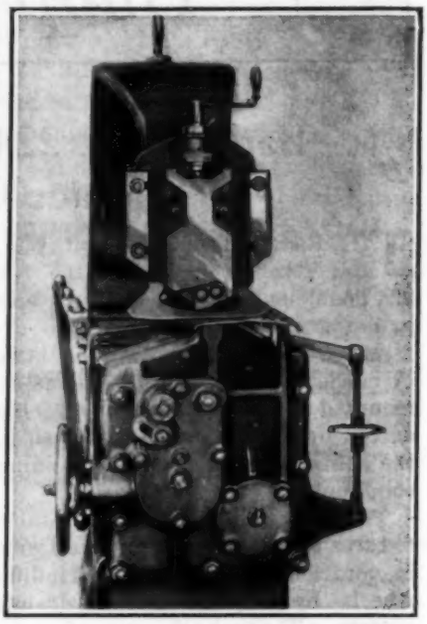


Fig. 2—Front view of the machine

The lower blade is attached to the rocker arm by two screws also, and horizontal adjustment for varying the blade clearance according to the thickness of material handled is provided by a screw with a square projecting end. After adjustment is made the screw clamp holds it rigidly in place.

The motor is first started and, viewed from the front, Fig. 2, the material is fed in from the right and delivered toward the left side. To support heavy sheets and to facilitate their movement, ball casters are mounted on swinging arms arranged on both sides of the frame as well as on brackets mounted inside of the throat of the machine. These arms and brackets are vertically adjustable. While the shearing takes place, the sheet is supported by the table in front and in the rear by rollers mounted on ball bearings. The latter are adjustable in height by means of the handwheel shown at the right, in order to take care of different gages.

In order to hold the sheet steady and thus relieve the operator of any possible strain, an additional sheet-metal guide is attached to the upper head. This guide has a wide opening to provide full visibility of the line to be cut. It can be adjusted up and

Shop Equipment News

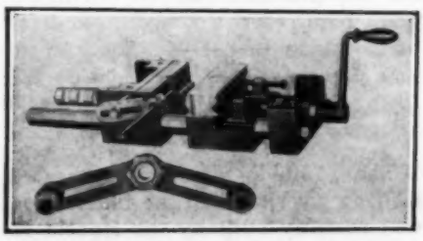
down to suit the required sheet thickness and can be clamped in position by means of clamping plates and bolts. It can be quickly removed when it is desired to trim the edges of flanged sheets.

In order to start a cut at any point within the sheet, the handwheel shown in Fig. 1 is manipulated, thus dropping the rocker arm with its blade while it is still in motion. The sheet can then be inserted in the opening between the blades. When the handwheel is turned in the opposite direction, the lower blade rises and due to its oscillation pierces the sheet with a shearing cut. As soon as the lower blade is back in its normal working position, the cut can be continued in the same manner as if started from the outside. Both the normal and the low position of the movable blade are reached with positive stops from the handwheel movement. In either case little effort is required to guide the sheet through the cut, as the blade motion is such that a feeding action is obtained.

The machine occupies a floor space of 6 ft. by 2 ft. 6 in. Its weight is about 5,000 pounds.

Miller & Crowningshield No. 6 Universal Drill Vise

The device illustrated in the accompanying photograph, designated as the No. 6 universal drill-press vise, has been placed on the market by Miller & Crowningshield, Greenfield, Mass. It is a light, strong vise



Miller & Crowningshield No. 6 Universal Drill-Press Vise

of wide range designed to hold various shapes and sizes of work while it is being drilled and tapped.

The rear block can be moved along the bars to any position and locked by slipping the key in to the slots in the bars. A screw is used for quickly clamping and unclamping the work. Lugs are provided for clamping the vise to the drill press table when it is turned up on edge for drilling the end of a long bar or any piece of work that cannot be held otherwise. The guide bushing holder can be set at various heights above the top of the vise jaw to accommodate the work and can be adjusted and locked in any position within 3 in. of the face of the jaw.

Slip bushings can be furnished for any size hole from $\frac{1}{8}$ to $\frac{3}{4}$ in. by 64ths with the regular-size bushing holder, and larger sizes with a special holder. Special vises with any length bars to accommodate long work can be furnished to order at slightly extra cost. The swivel jaw of the vise can be locked in any position by the adjusting screws located behind it, or it can be removed from its stud and the stud used for clamping odd- or irregularly-shaped pieces. Both steel jaws can be used with either side up to bring the V-grooves on the front or the back of the jaws.

The width of the jaws is 6 in., the depth $1\frac{1}{2}$ in., and the opening 8 in. The extreme length of vise is 22 in. and the diameter of guide rods $1\frac{1}{8}$ in.

Bridgeport No. 31-B Slitter and Disk Grinder

THE Bridgeport Safety Emery Wheel Co., Bridgeport, Conn., has designed an improved slitter and disk grinder designated as Model 31-B. The machine is arranged for integral motor drive, and no outside belting is employed. In Fig. 1 the machine is shown adjusted for grinding slitter cutters. Fig. 2 shows the workhead employing an expanding mandrel. The work can also be held in a magnetic chuck or fastened to a faceplate. With the magnetic chuck the machine will grind circular knives, meat chopper knives, slitters and the like. The grinding wheel is 10 in. in diam. by $\frac{3}{4}$ in. face and is mounted directly on the shaft of the driving motor, which is rated at 1 hp. at 1,800 r.p.m. The motor shaft is equipped with ball bearings, which carry both radial and thrust loads and thus stabilize the shaft endwise. The grinding wheel head is mounted on a swivel slide and can be moved in and out through a screw and handwheel. The ways are dovetailed and gibbed to take up wear. The workhead is also mounted upon a swivel slide at a right angle to the wheelhead slide and may be adjusted in the same manner. It has a graduated collar indicating the amount of feed. With these adjustments, convex, concave or flat faces, can be ground to any angle. The workspindle is driven by a $\frac{1}{2}$-hp. a.c. motor rotating at 900 r.p.m. This motor is mounted directly upon the workhead and is connected to the workspindle by a silent chain and suitable gearing to obtain the proper reduction in speed to 150 r.p.m. The workhead has a maximum swing of

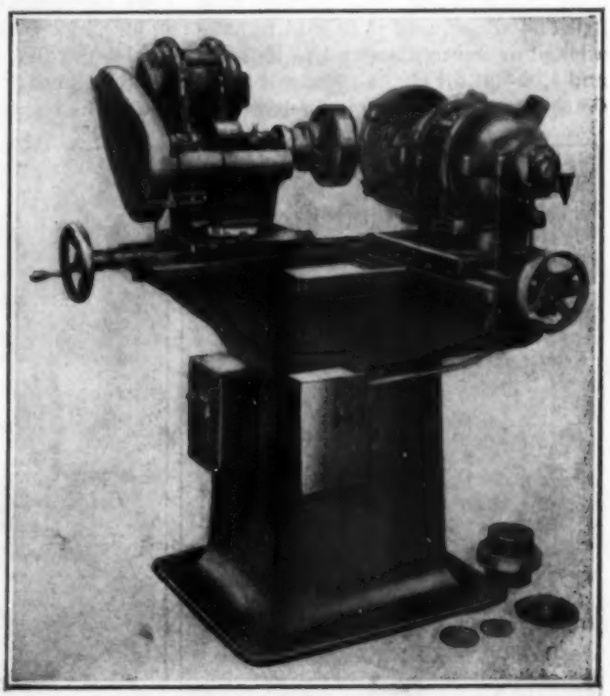


Fig. 1—Bridgeport No. 31-B Slitter and Disk Grinder with magnetic chuck

Shop Equipment News

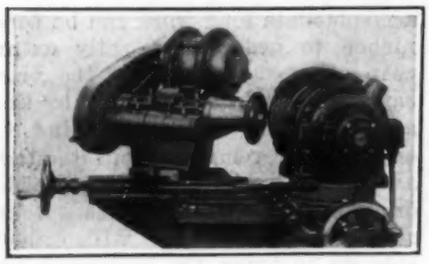


Fig. 2—Workhead with expanding mandrel

of work 16 in. in diameter over the ways.

The machine is arranged for grinding dry, but may also be used for wet grinding, using a centrifugal pump for furnishing the coolant.

The machine occupies a floor space of 42x42 in. and weighs about 1,250 pounds.

Marshalltown Inclinable Presses

The Marshalltown Manufacturing Co., Marshalltown, Ia., has developed a line of inclinable power presses in sizes from Nos. 1 to 5, inclusive. The plain model is shown in Fig. 1, while in Fig. 2 the geared model is indicated.

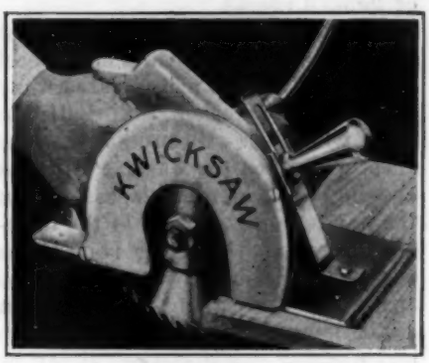
These presses resemble the standard line of presses put out by this company. A wrist-pin connection is used in the crank joint instead of a ball and socket and it is said to have a large pressure area and to be snug and tight at all times. The die space of the machine is large, permitting the use of leader-pin die sets and sub-dies. The cranks are extended long enough on both ends to attach cranks for any type of automatic feed. The bar knock-out in the slide is of rugged construction and the clutch is simple and dependable. All parts are of generous size to insure long life.

Porter-Cable "Kwicksaw"

A light-type, electrically-driven hand saw has recently been marketed by the Porter-Cable Machine Co., Syracuse, N. Y. It is built to meet the demand for an inexpensive tool and hence is simple in design. The saw revolves at a high speed and is said to leave a smooth edge, often making planing unnecessary.

The blade is mounted direct on a special motor armature, which runs in two precision ball bearings packed in grease. This design allows the full power of the motor to be delivered to the saw.

The tool complete weighs 10 lb. and can be easily operated by one hand, leaving the other hand free to support the work. A wide supporting shoe carries the weight of the tool, and is said to prevent tipping and to insure a square cut. The front of the shoe is graduated into a quarter-inch scale, and the edge allows the operator to follow the line in cutting. The opposite edge, which is also parallel to the saw, allows the use of a miter gage. By loosening the front handle the hinged supporting shoe can be set for any depth of cut up to 2 in. The "Kwicksaw" is said by the manufacturer to be especially adaptable for cutting out sections of flooring without injuring

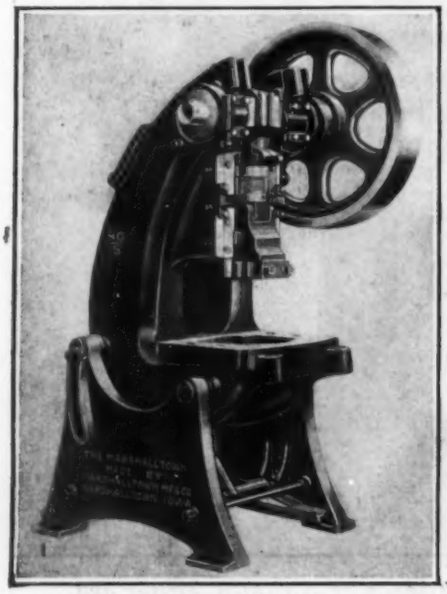


Porter-Cable "Kwicksaw"

the sleepers and for removing the projecting ends of sidings, roofings, and floorings.

The saw will withstand weather conditions as most parts are made of aluminum and duralumin. The motor is self-ventilated and the intake is screened, while the exhaust air is discharged inside of the guard thus blowing the sawdust away from the work and operator. The saw is well guarded as can be seen in the illustration.

Standard equipment consists of 10 ft. of rubber-covered cable, an armored duplex plug, one 7-in. combination saw which can be used for both ripping and cross-cutting. Either a 110- or 220-volt d.c., or a 25- to 60-cycle a.c. motor will be supplied according to specifications. Special saws, miter gages, and grinding attachments, can be furnished when required.



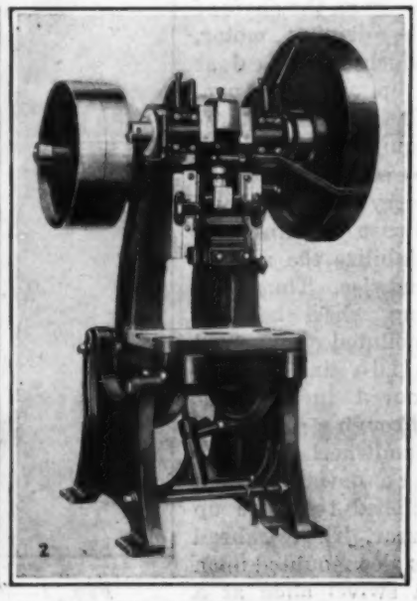


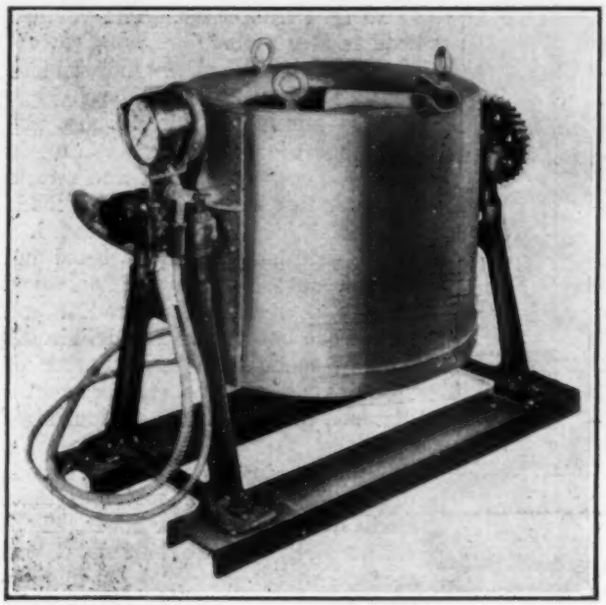
Fig. 1.—Marshalltown Inclinable Press. Fig. 2—Geared model

Trent 750-Pound Melting Pot

The 750-lb. electrically-heated melting pot shown in the illustration was recently built by the Harold E. Trent Co., 439 North 12th St., Philadelphia, Pa., for melting babbitt metal for large bearings. The pot has a pouring spout and tilting mechanism and is furnished complete with automatic temperature control apparatus.

The design follows closely that of standard Trent melting pots in that it has a special cast-iron crucible and a steel casing with heavy insulation between. The tilting mechanism

Shop Equipment News



Trent 750-Lb. Melting Pot

is operated by means of a hand-wheel conveniently placed. It drives through a worm gear. The pot is easy to tilt, yet positive in action.

The temperature control device is so placed that it controls the temperature in whatever position the pot may be. Correct temperature control is said to be important during the operating of melting and pouring babbitt metal and this part of the apparatus is featured. The pot is arranged for operation on single-, two- or three-phase circuits.

Blanchard Reaming Machine

The machine illustrated is for the hand reaming of holes from 1 to 3 in. in diam. It has been placed on the market by the Blanchard Machine Co., 64 State St., Cambridge, Mass., and is applicable to work of any size that can easily be handled.

The reamer is held in a vertical position by means of a Cushman two-jaw chuck and is rotated at either 21 or 38 r.p.m. The work being reamed is held in the hand or by a suitable wrench. Since the operator merely holds the work stationary while the machine supplies the power, the operation is not fatiguing. Since the work is free, the reamer is allowed to follow the hole without loss of accuracy. Because the reamer is vertical, there is no side pressure, if the work is properly held. Heavy pieces, or those having much weight on one side, may be counterbalanced by a spring attached overhead or by a cord and counterweight. Ordinary hand reamers may be used in the machine, but for continuous work a high-speed steel reamer is recommended as it will give better performance than a carbon-steel reamer. For holes having keyways, a spiral-fluted reamer, having an angle of spiral great enough to bridge the keyway, should be used. The machine is driven by a 1½-hp. motor mounted in the base of the machine. The motor carries a two-step cone pulley and is belted to a similar pulley mounted on a worm shaft. Screw adjustment of the motor base is provided for belt tightening. The worm and the gear it drives are completely inclosed and

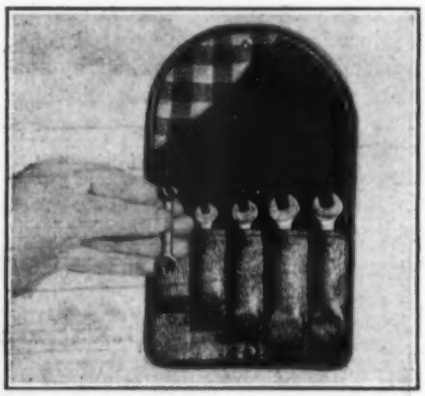
Blanchard Reaming Machine

run in oil. A ball thrust bearing is provided on the worm. The chuck shaft is lubricated by a grease cup, and this and the worm gearing are the only points requiring lubrication outside of the motor bearings. For holding reamer lubricant a pot is cast on the top of the machine near the chuck. The top slopes so as to drain all coolant into this pot.

Starting and stopping control and overload protection are furnished by a switch mounted on the base. Standard equipment also includes one gallon of reaming lubricant, a chuck wrench, and an oil brush. The machine occupies a floor space 36x 27 in. and it measures 37½ in. from floor to top of chuck. The net weight of the machine with a.c. motor is 750 lb., and with d.c. motor, 820 pounds.

Bonney No. 20 Miniature Wrench Set

The Bonney Forge & Tool Works, Allentown, Pa., has placed on the market a set of miniature chrome-vanadium wrenches, shown in the illustration. This kit, known as the



Bonney No. 20 Miniature Wrench Set

No. 20 kit, consists of five double-end wrenches with ten openings ranging from 3/32 to 11/32 in. They are neatly packed in a leatherette roll.

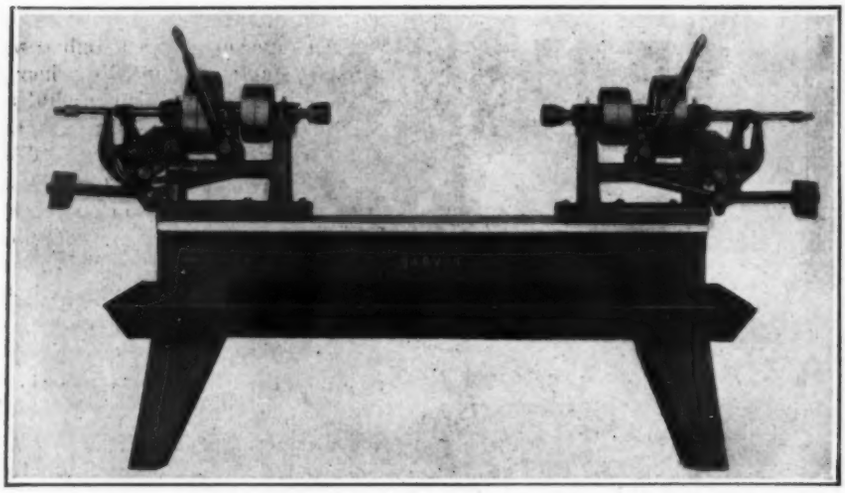
These wrenches are guaranteed to be stronger than the nut or bolt that they fit.

Garvin No. 2-X Duplex Horizontal Automatic Tapping Machine

The Western Machine Tool Works, Holland, Mich., is building the Garvin No. 2-X duplex horizontal automatic tapping machine illustrated for production use in automotive, electric, pipe manufacturing, and other industries where a large number of similar operations are to be performed. The machine may be used on small or large work that requires tapping holes in both sides or ends.

The two heads are movable along

Shop Equipment News



Garvin No. 2-X Duplex Horizontal Automatic Tapping Machine

the bed and either may be removed in a few minutes. The heads are equipped with Timken tapered roller bearings and are controlled by mechanically-operated friction clutches. Two pulleys are mounted on the head shaft and are intended to be belted direct to a lineshaft. The large pulley is for slow feeding while the small pulley is for rapid reversal of the taps at the end of the feed stroke.

Jigs or fixtures can be securely fastened to the bed between the spindles.

The machine is semi-automatic in operation in that it is only necessary for the operator to start the tap in the work. The tap enters to a predetermined depth and then automatically reverses and stops.

Morris Special Drilling Machine

IN THE accompanying illustrations are shown two views of a special machine developed by the Morris Machine Tool Co., Cincinnati, Ohio, for drilling cast-iron hydrant pipes. Fig. 1 shows the complete machine, while Fig. 2 shows the rear end of the drive mechanism at the head. The machine has two horizontal heads for mounting multiple drill-heads to drill the end of pipes, and one vertical head for drilling into the side. The two vises and the left-hand head are adjustable along the bed to take in pipe from 3 to 9 ft. in length. The vise jaws are independently adjustable to hold round or irregularly-shaped pipe from 4 to 10 in. in diameter. The vertical head is also adjustable.

Each spindle has an independent power feed with a dial depth gage and an automatic trip set for disengaging the feed after drilling to proper depth on repetition work. The spindles and quills are all made of special alloy steel, heat-treated.

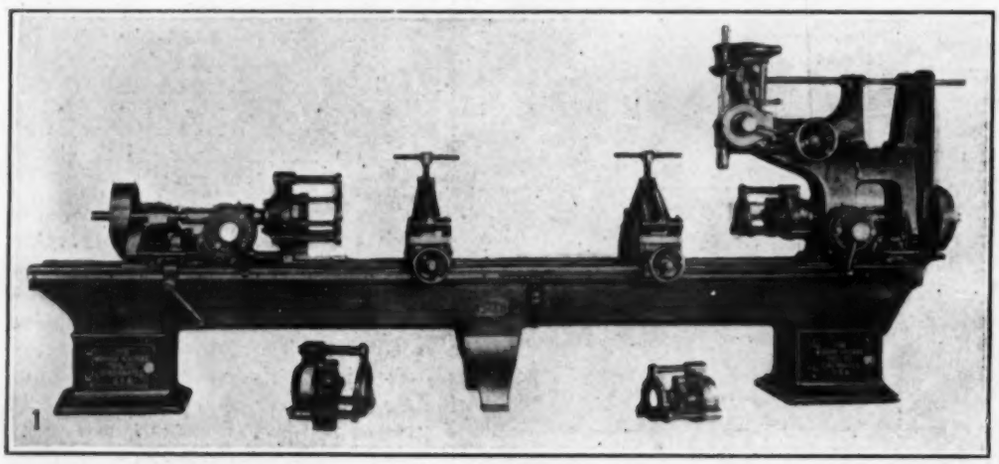
The drill heads have hardened and ground spindles mounted on fixed centers and carried on radial and thrust ball bearings. The drill heads may be made with any number of spindles at any reasonable center distance to take care of various sizes of pipe.

As shown in Fig. 2 the machine is driven by a 10-hp. motor with a chain drive to the rear shaft, where chains drive to the horizontal and vertical heads. The chain to the vertical head has an automatic self-adjusting idler.

"Ettco" No. 2 High-Speed Tapping Attachment

The Eastern Tube & Tool Co., 594 Johnson Ave., Brooklyn, N. Y., is marketing the No. 2 "Ettco" high-speed tapping attachment illustrated. This tool is designed for high-speed, sensitive tapping and has a capacity of ⅜ inches.

The leather-lined cone clutch and cast-iron driving cone have a smoothness of action and a slipping point that are said to eliminate tap breakage, even when a tap hits the bottom of a hole or sticks either in entering or backing out. The operator can control the feed of the tap, regardless



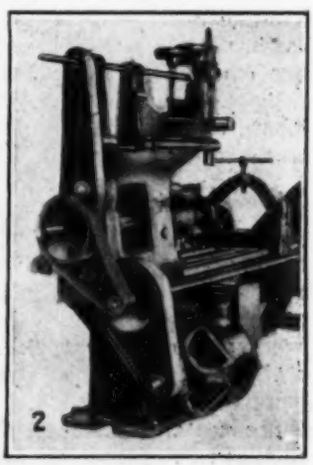
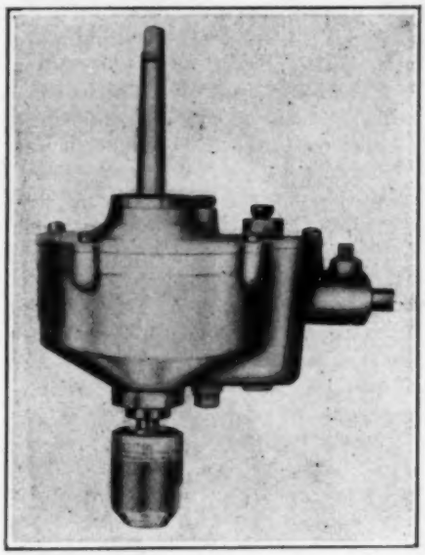


Fig. 1—Morris Special Drilling Machine for Cast-Iron Hydrant Pipe. Fig. 2—Rear view showing the drive mechanism

Shop Equipment News



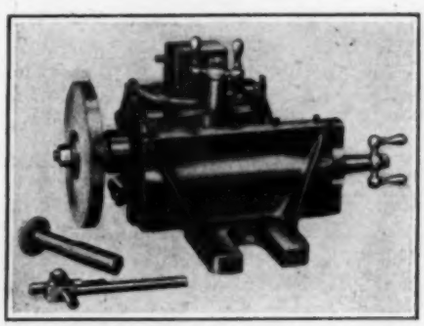
"Ettco" No. 2 High-Speed Tapping Attachment

of the speed of the drill spindle by means of the drill-press lever. The reverse speed is twice as fast as the forward speed. Left-hand threads can be tapped as readily as right hand, if the threaded Morse shank is locked in the tapper.

An aluminum case and light alloy-steel parts greatly reduce the weight of the tool so that it can be applied to light drill presses. All journals are hardened and ground and run in bronze bearings. It is claimed by the manufacturer that on some kinds of work this attachment will increase production from 100 to 500 per cent.

Standard Electrical Tool Co. Grinder Attachment

The Standard Electrical Tool Co., Cincinnati, Ohio, has developed the grinding attachment shown in the accompanying illustration for use on a lathe, milling machine or planer.



Standard Electrical Tool Co. Grinder Attachment

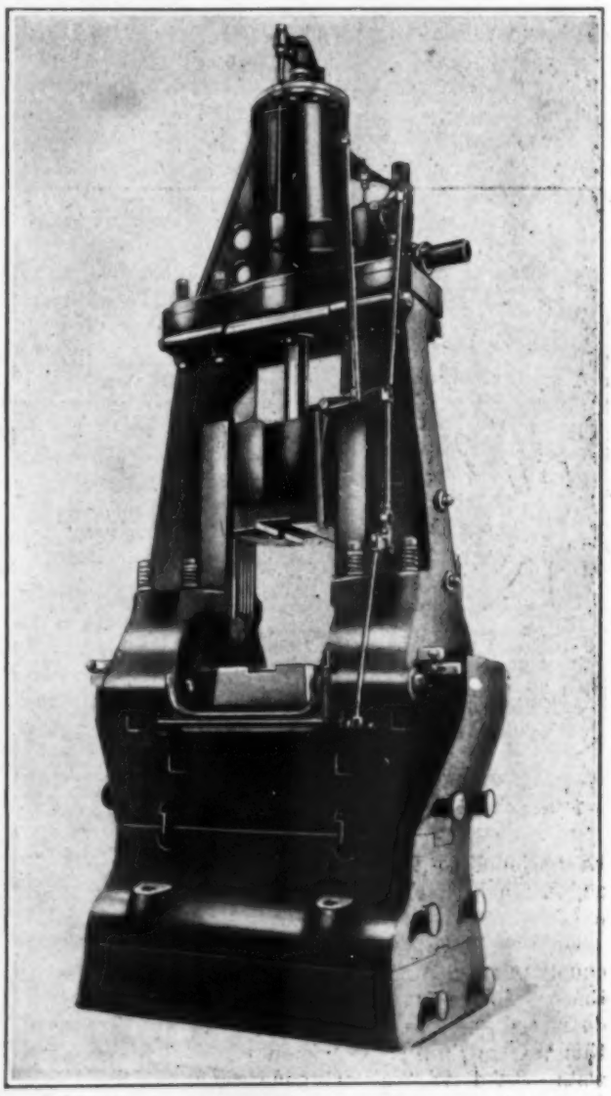
The machine is made in three sizes: With a ½-hp. motor carrying a wheel 8 in. in diam. by 1-in. face; a 1-hp. motor carrying a 10x1-in. wheel; and a 2-hp. motor carrying a 14x1½-in. wheel. It is provided with both vertical and horizontal feed motion. The horizontal bracket can be made any length desired and is especially adapted for grinding collector rings on large generators.

The bearings are made of high-grade phosphor bronze and are of split taper form to provide adjustment for wear. They are said to be dustproof. The adjustment of the bearings is made by locknuts under the emery wheel flanges.

Large Erie Steam Drop Hammer

A STEAM drop hammer of large size has been completed by the Erie Foundry Co., Erie Pa. The reciprocating parts of this machine, including the top die, weigh 20,000 lb., and the total weight of the machine is approximately 250 tons. It was necessary to cast the anvil in three pieces, in order to facilitate installation. The overall height of the hammer is 33 ft., but when installed most of the anvil will be below the floor line, which is at the level of the treadle shown just below the sow block. The working face of the ram is approximately 44 in. square, the cylinder bore 25 in., the rod diameter 9 in., and the rated stroke of the hammer is 50 in. The hammer is constructed almost entirely of steel castings and alloy-steel forgings. The frames are of box sections and they support the guides on five sides, no provision being made for guide adjustment. The bottom separators between the frames are of the drop type instead of the usual cylindrical spreaders around the bottom tiebolt. The entire upper part of the hammer forms a rigid unit which can be adjusted across the anvil to align the dies. Wear can be taken up in this direction by means of the wedges shown. For compensating for wear in the other direction gibs are provided.

This hammer was designed specifically for the manufacture of drop-forged valve bodies. It is capable of forging 8-in. valves for high-pressure, high-temperature service, 24 in. in outside diameter.



Large Erie Steam Drop Hammer

Shop Equipment News

Niles Improved No. 3 Axle Lathe

THE Niles Tool Works Co., Division of the Niles-Bement-Pond Co., 111 Broadway, New York, N. Y., has added two features to its No. 3 double-axle lathe shown in Fig. 1. It is claimed that these features add greatly to the convenience and productive capacity of this machine.

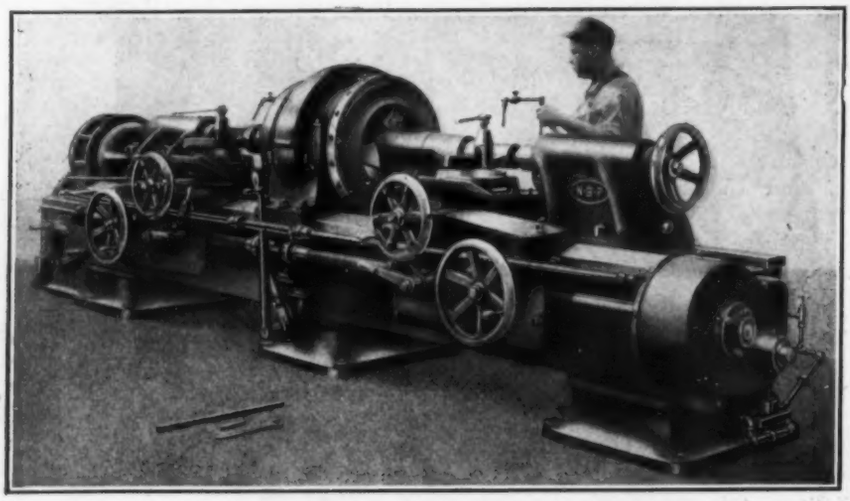


Fig. 1—Niles Improved No. 3 Axle Lathe

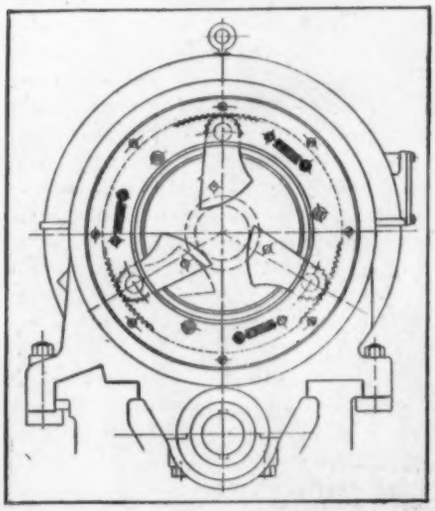


Fig. 2—Equalizing driving head

Either or both of them are offered as optional to the standard equipment.

One improvement consists of an equalizing driving head in place of the regular driving plate and driver dogs. The general construction of this head is shown in Fig. 2 and consists of a driving spool upon which is mounted an internal gear ring, the outside of which is drilled with equally-spaced radial pin holes. Three serrated driving dogs are pivoted in these holes and the heel of each has a segment of a gear cut in it that meshes with the internal gear ring. Each dog swings on its pivot and is held in engagement with the axle by means of the springs shown. Once the dogs come in contact with the axle and the machine is started up, however, the pressure of the cut will increase the grip and prevent any slip.

An equalizing feature in these drivers takes care of any eccentricity or roughness in the axle forging without distorting the axle. Also, each dog takes its equal share of the load. To release the dog, a pinch bar is inserted into one of the radial pin holes and the gear ring given a partial turn, thus opening the jaws. Provision is made to hold the jaws open for removing or inserting axles. Axles up to the full capacity of the machine can be driven by means of this driver with the one set of jaws, as there is considerable rotary movement of the ring gear.

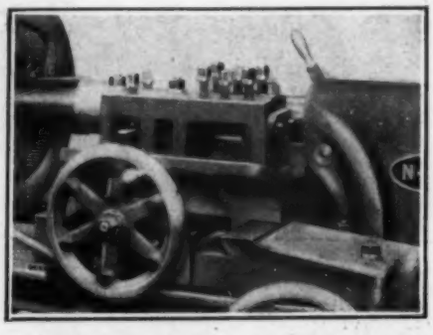


Fig. 3—Multiple toolholder

The second improved feature is a multiple toolholder, shown in Fig. 3. It carries four tools so spaced and shaped as to perform their specific operations on the collar journal, dust guard, and wheel seat, respectively, with a minimum of movement of the carriage. Means are provided for the proper location of the tools so that they may be withdrawn for sharpening and re-inserted without destroying their relative positions with one another.

Hyro No. 18 Duplex Fixture Punch

The Hyro Manufacturing Co., Inc., 350 West 13th Street, New York, N. Y., is marketing the improved No. 18 duplex metal punch. This tool was recently redesigned

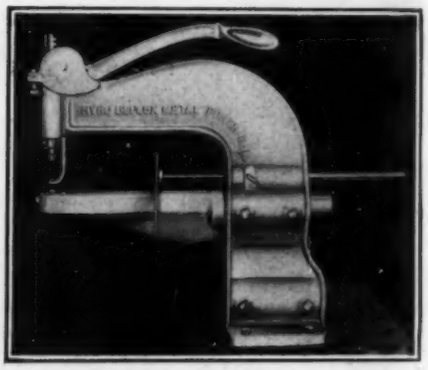


Fig. 1—Hyro No. 18 Duplex Fixture Punch arranged for punching flat stock

to meet the requirements for punching 14-gage steel or lighter. It can also be used for inserting eyelets, slip rings, and other hollow work.

The machine will punch any round hole up to $\frac{3}{4}$ in. diam. in 14-gage steel, $\frac{5}{8}$ in. in 16-gage, $\frac{7}{8}$ in. in 18-gage, and $1\frac{1}{16}$ in. in 20-gage. Stock sizes of punches and dies are furnished in nineteen sizes ranging from $\frac{1}{8}$ to $1\frac{1}{16}$ in. in diam. Irregular shapes can be punched by using special punches and dies made according to specifications. A guard is used to strip the work from the punch when the handle is raised. In Fig. 1 is shown the No. 18 punch with the arbor placed in the upper opening in the frame for punching flat work up to 20 in. in diam. Fig. 2 shows the

Shop Equipment News

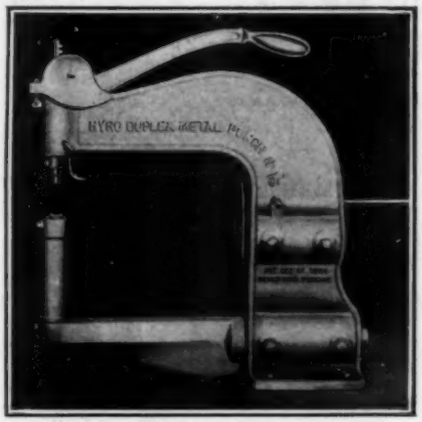
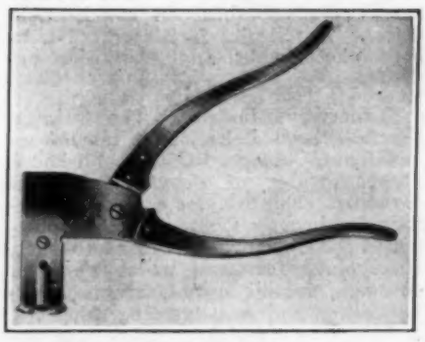


Fig. 2—Machine arranged for punching deep pans

arbor inserted in the lower opening of the frame. In this position the punch will accommodate deep pans, channels and many other irregular shapes such as lighting fixtures.

Burgan Cotter-Pin Extractors

The Burgan Corporation, 9 S. Clinton St., Chicago, Ill., is marketing a cotter-pin extractor in two sizes. The illustration shows the Junior model used in extracting pins of ½ in. and smaller. It is compact



Burgan Junior Cotter-Pin Extractor

in design and is for use around motors, transmissions, differentials and similar places.

The Heavy-Duty extractor removes cotter pins up to ¾ in. and is designed for use on chassis and other heavy assemblies where large cotter pins are used. These tools are parkerized and polished.

To use the tool one jaw of the extractor is inserted in the eye of the cotter and the handles are pressed toward each other.

Victor Style M Receding-Chaser Collapsible Tap

THE Landis Machine Co., Waynesboro, Pa., has designed the Victor Style M receding-chaser collapsible tap shown in the accompanying illustrations for cutting tapered threads in tool joints, casing shoes, pipe couplings and flanges, valve bodies, fittings and the like. The Style M tap is made in three groups, each employing one body with a series of detachable heads. Group I, known as the No. 4M body, 4 in. in diam., cuts threads from 4½ to 5¾ in. outside diameter; Group II, known as No. 6M body, 5 in. in diam., will cut threads ranging from 6½ to 13⅜ in. outside diameter, while Group III, known as No. 14M body, 7 in. in diam., will cut threads ranging from 13⅜ to 24½ in. outside diameter.

Fig. 1 shows the assembled tap, while Fig. 2 shows the various parts. The body includes the cam collar, cam slide, the cam itself, plunger extension, expanding collar, trip-ring rods and minor details. The head includes the plunger, chaser blocks, chasers, tap and tap ring.

The head is made of S.A.E. Steel 1045, heat-treated and ground all over, including the seat of the chaser block slots. It is bolted to the flanged end of the body by hollow-head socket screws placed in the bottom of the chaser block slots. Ground surfaces on both the head and body insure alignment. A heavy key is inserted between the body and the head to take the driving strain. The chaser blocks are made of the same material and are also hardened and ground all over. These blocks are interchangeable among all the heads in Group I, and the same blocks are interchangeable in all heads in Groups II and III.

The chasers are all made of high-speed steel, ground all over. The threads are ground after hardening to insure accuracy of form and lead and to give maximum service. The number of chasers used per head is on the basis of one chaser per inch of diameter in the even-numbered sizes. The odd-numbered sizes have the same number of chasers as the one size smaller even numbered one. For example, a 7-in. head has six chasers. Chasers for cutting any form of thread can be supplied.

The plunger of the Style M tap is made of S.A.E. Steel 1045 and is hardened and ground all over. The seats of the slots in which the chaser blocks move are also ground to insure perfect bearing. The trip ring

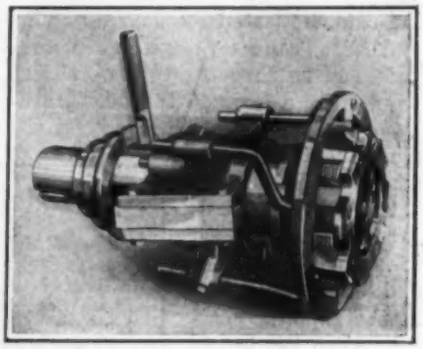


Fig. 1—Victor Style M Receding-Chaser Collapsible Tap

is made of the same material and is hardened and ground to provide maximum wear as it contacts with the work during the tapping operation. The holes for attaching the trip ring rods are so placed that the same rods will fit all rings in the same group. A separate trip ring is required for each size of head. The body of the tap is also made of S.A.E. Steel 1045 and is internally and externally ground to afford proper fits for all working parts. Special-length bodies can be furnished as required to suit special jobs.

The cam collar is a semi-steel casting which carries a cam slide and cam. Its position on the body and the distance that it moves along the body determine the length of thread being cut. A special collar is required for cutting threads longer than the maximum length of 4½ in., which is standard. The cam slide is made of tool steel, hardened and ground all over. It is inserted in the top of the cam collar and carries the cam as the collar recedes. The cam is finished in the same way. The top is milled for cutting any two tapers of thread by proper pivoting in the cam slide. The cam works between two hardened tool-steel gibs inserted in the tap body. Angles

Shop Equipment News

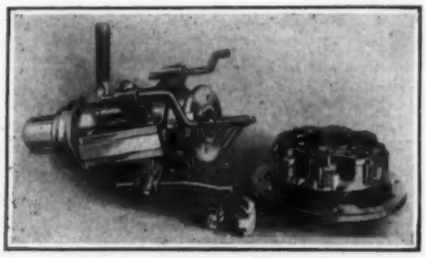


Fig. 2—The tap disassembled

are milled on the sides of the cam for contact with the plunger extension, and a downward movement of the cam, imparted by the cam collar and slide, causes the plunger to recede and in turn draws the chasers to produce a tapered thread. Hardened tool-steel shoes are set in the plunger extension for contact with the cam.

The expanding collar on the tap is used to expand the chasers and set the cam collar in the tapping position when the tap is rotated. A straight, forward or downward pressure is necessary. This is usually done through a yoke ring that engages the collar on the return movement of the spindle while the tap is in motion.

The Style M tap is regularly furnished for cutting tapers of $\frac{3}{8}$ and $\frac{3}{4}$ in. per ft. Any combination of the two tapers can be provided, and a change from one to the other can be accomplished in a short while.

The size adjustment on the chasers is obtained through a screw easily accessible in the front end of the plunger. An adjustment of approximately $\frac{1}{8}$ in. either over or under size can be obtained on each head.

These taps can be used as either rotary or stationary taps. When used as a rotary tap, the tap is expanded by means of a special collar, while when used stationary the tap is expanded by hand with the operating lever shown.

The standard shank for taps in Group I and II is 4x6 in., while in Group III it is 5x6 in. Special shanks can be furnished as required. They can also be fitted with driving flanges for bolting to the spindle of a machine.

Federal Dial Thickness Gages

Two models of dial thickness gages for measuring cylindrical stock were recently placed on the market by the Federal Products Corporation, Providence, R. I. Fig. 1 shows Model 264 equipped with Model 50 indicator graduated to 0.0005 in. Other models of indicators can be used with the same frame. Fig. 2 shows Model 260 equipped with Model 30 indicator graduated to 0.0001 in. The jaws of these gages can be made to take any diameter of stock from 0 to 2 in. Adjustable lower anvils are supplied when the gages are used to measure a variety of sizes greater than the range of the indicator.

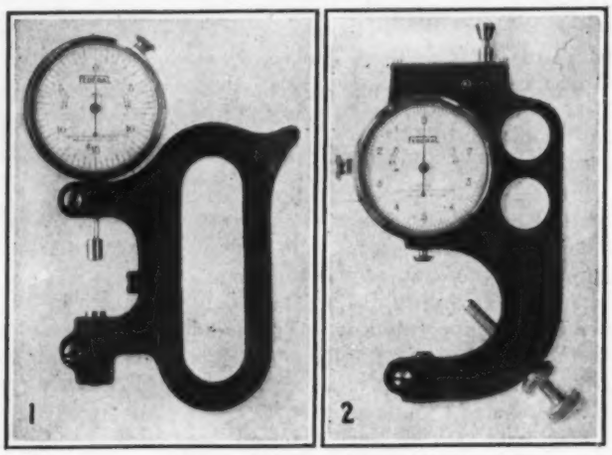


Fig. 1—Federal Model 264 Dial Thickness Gage
Fig. 2—Model 260

These gages were originally designed for measuring the diameters of crank shafts and can also be used for measuring wristpins, bushings and other cylindrical pieces.

Armstrong No. 26 Wrench Set

The Armstrong Bros. Tool Co., 317 N. Francisco Ave., Chicago, Ill., recently placed on the market the wrench set No. 26, shown in the illustration. This set is made up of six Armstrong-Vanadium wrenches in a leatherette roll. The wrenches include openings for five U. S. Standard nuts, eight S.A.E. nuts, and eight hexagonal cap screws. Openings are from $\frac{3}{8}$ to 1 in. by sixteenths.

The wrenches are drop-forged from a special chrome-vanadium steel, heat-treated and finished in nickel over copper. The deep-set jaws are thin and narrow so that they can be manipulated in close quarters. The wrenches are guaranteed not to break or spread.

Armstrong No. 26 Wrench Set

Trade Catalogs

Furnaces, Electric. The Ajax Electrothermic Corporation, Division of the Ajax Metal Co., Trenton, N. J., has published a leaflet describing the Ajax-Northrup electric furnaces. The particular installation described will melt 250 lb. of metal in 20 min. the heat being supplied by high-frequency currents induced in the metal. The construction and operation of this type of furnace is explained in considerable detail. The leaflet is illustrated with both photographs and cross-sectional views.

Furnaces, Industrial. The Chicago Flexible Shaft Co., 5,600 West Roosevelt Road, Chicago, Ill. has published a pocket catalog of Stewart industrial furnaces. This booklet contains forty-four 4x8-in. pages, and it is well illustrated throughout, largely by halftones. Heavy-duty furnaces, under-fire oven furnaces, inbuilt oven furnaces, tool-hardening and heat-treating furnaces, and various special furnaces are described and illustrated. Oil-pumping equipment, air blowers, oil burners, pyrometers, and special carbureting boxes are also listed.

Pressed Steel Parts. The Youngstown Pressed Steel Co., Warren, Ohio, has recently issued several pieces of literature describing the YPS corrugated pressed steel platforms for lift trucks, solid boxes, sectional boxes, tote pans and compound boxes. The various advantages of the corrugated platforms are brought out and numerous examples are given to prove the adaptability of the sectional boxes for both transporting and storing materials. All of the leaflets are well illustrated throughout, largely by photographs.

NEWS OF THE WEEK

British Machinery Industry Shows Improvement in Export Trade

Unemployment declines one-third in last four months

By Our London Correspondent

IT IS difficult to see any marked difference of late in the position of the machine tool industry in this country. Reports are rather conflicting, some firms mentioning good domestic orders with sounder inquiries, while others are not so fortunate. Some firms that have specialized in overseas trading report more cheerfully as to conditions, suggesting a revival in demand from the continent of Europe, though orders from that area are still of a somewhat spasmodic character. The French motor industry in particular still provides customers for the maker of turret lathes here.

The British dominions continue to form the best market, and business has of late been done with India and with South Africa, while Canadian firms have purchased quite a number of woodworking machines, for pattern-making and other purposes. A feature of this section of the industry is the direct application of electric motors for driving purposes. The extended use of electric power has caused this development. Returning to machine tools, some few special tools have been sent to the United States, and even Japan has been a customer, although the position in China retards business in that area. Against this has to be placed the fact that official figures of exports early in the year showed some decline, but these figures relate to orders already executed.

Ban German Tools

At the annual meeting of the Machine Tool Trades Association it was decided to maintain the ban on German tools at the 1928 exhibition. The matter was discussed behind closed doors. The decision had the immediate effect of causing two or three firms to resign, so that the membership, which at the end of last year had declined to 116, will be further reduced. The statement of accounts showed a loss of £490 in the year. A loss is to be expected, as the annual subscriptions by no means cover the expenses, and for its continued existence the association must in present conditions depend on profits made at the machine tool exhibitions organized by itself. The last of these exhibitions showed a loss. The government has been taking a hand in exhibitions and the civil service estimates for the financial year just entered give a figure of £58,972 for the British Industries Fair, in which members of the Machine Tool Trades Association take no part except as to small tools. Some £36,750 is to be provided for exhibitions connected with overseas trading, almost entirely for participation in trade exhibitions in Great Britain.

The figures that have been published regarding the numbers of persons registered at the labor exchanges as unemployed have shown a very steady decline during the current year and appear to be rapidly nearing the million mark, at or about which the insurance fund becomes solvent. At present, as far as is known, the fund is in debt to the extent of about 25 million pounds. At the moment of writing the latest figures as to unemployed work people give a total of 1,078,500, and when this is compared with the figures for the first week of the year, namely, 1,495,839, no words will be needed to emphasize the improvement. Another feature of importance is that some advance is being made in the heavier industries, but in mining much leeway has yet to be made up and something like 200,000 people in this industry are still unemployed, a position not altogether unforseeen when the dispute of last year was inaugurated. Put briefly, it is felt that the industry cannot support all these men and that it was, in fact, overmanned before the dispute came to a head. At the moment the only official figures relating to the finances of the unemployment fund are for the year ending roughly with June last. During that period contributions from all sources reached £46,845,738, mainly the government contribution of £12,910,860, and £33,615,623 from employers and employed.

Preliminary reports are being issued from week to week relating to the census of production taken in connection with the year 1924. In one of the latest the figures suggest that the total value of the goods made and work done during that year by the motor and cycle trades amounted to £93,819,000; the net output of the factories and workshops concerned, after allowing for the cost of the material used and the sums paid for work given out, was £45,329,000. The total value of motor cars and chassis, including commercial vehicles, was £40,059,000; of parts of motor cars except chassis £14,367; of motorcycles and tricars complete £5,877,000; of cycles and tricycles not mechanically propelled £3,774,000; parts of motorcycles, etc., £2,588,000; parts of cycles not mechanically propelled £3,998,000; of various parts not separately distinguished £2,111,000; and of airplanes and parts £3,563,000; while the sum of £2,615,000 is entered as the selling value of all other products and £14,887,000 as the total value of repair work done. By comparison with the census for 1907 or that for 1912, a reduction is shown in the average factory value of motor cars and chassis, while motorcycles have increased somewhat in value and ordinary cycles only slightly. The reductions in average value are regarded as "due in part to improvements in manufacturing technique and to standardization resulting from production on a large scale," but mainly to the increased demand for the relatively low-powered, less costly car or van. The net output per person employed in 1924 was £226 against £109 in 1907.

Recently it was stated that the value of British-produced exported motor cars and parts last year was £9,120,000, the value of the net imports being £5,816,000, and it was asserted that prices are now about 10 per cent below pre-war rates for private cars and about the same as pre-war for commercial cars.

Returning to the census of production, another report shows that the total value of work done in private shipbuilding yards in 1924 was £51,225,000, the estimated selling value of ships, etc., wholly constructed during the year being £6,804,000; of new constructions not wholly completed £27,769,000; and of repair work £16,652,000. Deducting cost of material, the net output was £22,222,000. The total value of goods made and the work done in connection with marine machinery by shipbuilding firms who were also marine engineers was placed at £13,662,000, the net output per person employed in the shipyards being £164, and £160 per person employed in the marine engine works concerned.

Metal Trades in Spain Facing Crisis

The *Fomento del Trabajo Nacional* notes a crisis in the Spanish metallurgical, machinery and tool trades, particularly in the provinces of Catalonia and Guipuzcoa (Barcelona and Bilbao). It is said to be due to increasing labor costs which are much higher than like wages paid in France, Italy and Belgium with their depreciated currencies.

The handicap on this score alone is estimated as being about 400 per cent, which not even the most strenuous energy or wise administration of business can effectually overcome, even considering that the home market is now highly protected. Tariff duties as a whole, are perhaps the highest in Europe, but even as heavy

as they are in most manufactured lines, they are not wholly effectual and many specialties which might be catered to by Spanish manufacturers are imported monthly in increasing values.

The example is cited of American automobiles, agricultural and other machinery. The Spanish 15-cent peseta (a discount of 25 per cent from normal) admits of American competition with the French imported article which comes from a country which has a 4 cent franc. The anomaly appears on the surface in theory only but in practice it is found to be very real. There is no question that in spite of tariff handicaps the import of metal manufactures in the peninsula are mostly on the increase.

It is impossible for the Spanish metal trades to think of general export business with conditions as they are. Raw materials in the peninsula cost double what they do in Belgium and France, and with the virtually gold wage scale of Catalonia the handicap is for the moment insurmountable. Furthermore, a new customs accord is about to be put into effect with Great Britain, bearing favorably on 70 items of "metal manufactures" and this, of course, will in no way help Spanish special industries however much it may prove to be for the general economic good of the country at large.

It is admitted by the report from which these facts are quoted that a lack of standardization, a too greatly divided or specialized industry and a lack of diffusion of technical education have played no small part in pegging the Spanish metal manufacturing industries where they stand today.

It is proposed as one method of stimulating trade that all government purchases in fabricated metal lines be made only of Spanish manufacturers through a period of years. The business resulting will not be a negligible quantity and will undoubtedly help to shrink the import values of foreign-made commodities. It is proposed also to forbid the establishment of new firms operating in certain lines, which however are not for the moment mentioned specifically, where there is danger of their product overlapping with that of firms already catering to the market in a sufficiently ample manner.

Political and Financial Instability Clouds Future of French Industry

Machinery and tools in moderate demand

By Our Paris Correspondent

THE general industrial situation has improved since the opening of the year, but the immediate future does not loom preponderately brilliant. Deep and serious causes, borne of the political and financial situation, still bear heavily on the economic status.

Production for immediate trade needs has not been encouraged as was expected in many lines of the metal trades, and absorption by the consumer is still at a low ebb, pending a fall in selling prices. No immediate reductions are likely, save as a temporary trade stimulant and unless production costs can be reduced by some means which will not touch the workers' wage, trade conditions will rest uncertain.

The anticipated spring business has not materialized as hoped, though actually the price scale in the metallurgical and metal transforming trades is, in many cases, below that of world market prices as based on gold values. The fact that the French buying public does not seem to appreciate just how favorable prices in the home market really are can be due only to the depreciated value of the franc at 25 to the dollar. As illustration: A pair of cutting pliers selling in Switzerland for 2 Swiss francs can be duplicated in France at 7 or 8 francs, whereas, following the gold barometer, the price should be 10 francs. On many items up and down the scale the same comparison may be deducted.

The new 7-hp. Fiat automobile sells in Italy at 15,000 lire; there is nothing in France or French manufacture to compare with it at less than 18,000 to 20,000 francs. This shows a divergence in price as wide on the other side as the former comparison.

Of new government projects in view none is more likely to present surprises than the revised customs tariff. Various industries and syndicates are making their desiderata known in official quarters and it seems more than probable that, like Italy and like Spain, a very high tariff will be imposed upon all manufactured articles from abroad with a low tolerance for raw materials. This will be a protective tariff rather than a revenue tariff. It will bear heavily, as has been made public to date, on iron and steel tools and appliances for metal and wood working, iron and steel wire, textile machinery, cutlery, carriage and automobile hardware and accessories and parts, locks and other building hardware, chains, wire mattresses, springs, screws, bolts, etc.

The chamber of deputies is discussing a modification of the French patent law with a view to securing additional protection and making fraud less likely. The chief clause puts the onus of an honest declaration on the inventor who will be held responsible for all civil damages if he loses a case in court because of a false declaration. It is proposed that the period in which a claim can be made for the usurpation of patent rights be three years.

The automobile industry in general is suffering from a tightening of the buying market. Three minor firms have shut down entirely during the past month, in addition to two others, more important, which have closed their doors since the first of the year.

While the big names in the trade are proceeding at a retarded pace only Citroen appears to have taken a real spurt. It is claimed that the plant has taken on 10,000 workers and has a present output of 400 cars a day. A coincident price drop of from two to three thousand francs on various models has been made, meeting the cut of the Ford organization in France of a drop on the touring car from 18,500 francs to 14,500 francs.

An automobile war on a small scale seems likely; the statement is qualified for the reason that with eight hundred thousand registered motor vehicles in France it seems unlikely that the annual registration increase can be very great from now on.

There remains the export market and French makers of small cars, in two instances at least, are looking to a continuance of the foreign trade which they have built up and even to increasing it, believing that such cars now in mass production can compete in the matter of price with the even bigger output of American cars in foreign markets.

A gratifying come-back, anent the liquidation of the celebrated automobile firm of De Dion, Bouton et Cie, is shown by the Society for the Encouragement of National Industry having awarded its gold medal to the Marquis de Dion in recognition of his having been "the innovator and animator of the automobile movement in France."

Wire and wire nail makers are feeling the pressure of the trade efforts of the German, Belgian, Dutch and Czecho-Slovak wire consortium in export lines and are looking for increased protection which shall prevent dumping in France.

Some railway hardware and fitting orders for future delivery are being placed which will serve to keep those fortunate enough to book them going for some time. These orders have emanated as well from the trunk line railways themselves as from private car building firms. Locomotive builders have received satisfactory orders since the first of the year and are bidding for an order of 100 locomotives and 1,500 rolling stock units for the Anatolian Railway being laid down for the Turkish government.

Capital Tied Up

Machine tools and hand tools are finding but moderate demand and distributors are carrying stocks longer than usual with the result that prices are often broken to enable realization on frozen inventories. Aside from such exceptions prices have been virtually stable since the first of the year.

Small tools are being offered by several of the larger manufacturers at varying increased discounts from list. This applies to wood and metal working tools alike. Farm tools on the other hand are carrying a majoration of 10 per cent upwards. Agricultural machinery and tools have shown an increased output more or less intermittently since the war but manufacturers are looking forward to tariff protection which will secure for them a bigger share of the home market when the French farmer actually wakes up to the necessity of farm machinery.

Machine Shop Practice Session at New Haven Show

The first national meeting of the Machine Shop Practice Division of the American Society of Mechanical Engineers is to be held during the Seventh Annual Machine Tool Exhibition, Sept. 6, 7, 8 and 9, at New Haven, Conn. Under the supervision of James H. Connolly, of Auburn, R. I., appointed by L. C. Morrow, chairman of the Machine Shop Practice Division, vigorous efforts have been under way for several weeks past to shape up the program for the technical sessions. It is expected that these sessions will be held on the mornings of Sept. 7, 8 and 9, at which times the show itself will be closed down.

On Wednesday morning the session will be devoted to the consideration of the selection of machine tool equipment. The speakers will be Myron Curtis, chief engineer, the Potter & Johnson Machine Co., Pawtucket, R. I., and L. C. Morrow, managing editor, *American Machinist*. The title of Mr. Curtis' paper will be "Economies of Machine Tool Replacement," while Mr. Morrow will speak on "Advantages of Up-to-Date Machine Equipment."

On Thursday morning parallel sessions will be held. One will be devoted to the problems of finishing machine tools and other mechanical equipment for looks and durability at reasonable cost and in as short a time as possible. The principal speaker at this session will be W. R. Atwood, of the chemical products division of E. I. DuPont de Nemours & Co., Parlin, N. J., on "Modern Finishes for the Machine Tool Industry," and B. H. Divine, of Divine Bros. Co., Utica, N. Y., on "Fundamentals of Polishing."

The other session will be devoted to the general subject of "Foremanship Training," and will be under the direction of John T. Faig, president of the Ohio Mechanics' Institute, of Cincinnati.

Parallel sessions will likewise be held on Friday morning, one devoted to cold working of metals and the other to anti-friction bearings. At the metal working session the speakers will be John R. Shea and John L. Alden of the Western Electric Co., and James H. Connolly and Thomas Allen, respectively, general manager and engineer of the Standard Machinery Co., Auburn, N. Y. Messrs. Shea and Alden will be the joint authors of a paper entitled "Improvements in Copper Wire Mill Equipment." Messrs. Connolly and Allen will cover "Rotary Swaging and Its Effect on Materials."

At the anti-friction bearing session, the speakers will be Robert F. Runge, vice-president, S.K.F. Industries, Inc., and Frank Brauer, chief draftsman, Watertown Arsenal, Watertown, Mass. Mr. Runge's subject will be "Principles of Designing Machine Tools with Anti-Friction Bearings." Mr. Brauer will cover "Anti-Friction Bearings on Ordnance Work."

The New Haven Machine Tool Exhibition is an annual engineering event, and is sponsored by Yale University, the New Haven Chamber of Commerce and the New Haven Section of the American Society of Mechanical Engineers. This year particular stress will be placed upon the need for the early initiation of sweeping re-equipment programs in the metal working industries of New England and of the East in general. Such programs are already under way in certain large organizations and industries in this territory.

A. S. S. T. Nominations

At a meeting on April 18 of the American Society for Steel Treating, the nominating committee submitted the following candidates for the coming term:

Officers of the executive committee—Charles McKnight, Jr., for chairman; F. W. Lucas, Western Electric Co., for vice-chairman; F. N. Holden, Jr., E. W. Bliss Co., for secretary and treasurer.

Members of the executive committee for re-election—R. L. Johnston, Aluminum Die Casting Co.; Edgar C. Bain, Union Carbide Co.; J. J. Crowe, Air Reduction Sales Co.

New members of the executive committee—E. E. Thum, Linde Air Products Co.; A. A. Hassan, Jr., Crucible Steel Co. of America; J. B. Romer, Babcock & Wilcox Co.

Machine Tool Builders Add to List of Exhibitors

The National Machine Tool Builders' Association has announced a list of additional exhibitors in the unified showing of American machine tools and related equipment and accessories to be held in Cleveland, Sept. 19 to 23.

It is possible that a still further list may supplement this one, according to the association, depending upon the exact and final utilization that may be worked out of the limited display area afforded by the additional section of the exposition which has been provided.

The list follows:

Anderson Bros. Manufacturing Co., Rockford, Ill.; Beatty Mach. and Manufacturing Co., Hammond, Ind.; Buckeye Portable Tool Co., Dayton, Ohio; Clipper Belt Lacer Co., Grand Rapids, Mich.; *Industry Illustrated*, New York; Hanchett Sewage Works, Big Rapids, Mich.; Hall Planetary Co., Philadelphia, Pa.; Higley Machine Co., So. Norwalk, Conn.; Hydraulic Press Manufacturing Co., Mt. Gilead, Ohio; *Iron Trade Review*, Cleveland, Ohio.

Hyatt Roller Bearing Co., Newark, N. J.; Kingsbury Machine Co., Keene, N. H.; Link Belt Co., Indianapolis, Ind.; Madison Kipp Corporation, Madison, Wis.; Morton Manufacturing Co., Muskegon Heights, Mich.; Oakite Products, Inc., New York; Oster Manufacturing Co., Cleveland, Ohio; Ramsey Chain Co., Albany, N. Y.; Sun Oil Co., Philadelphia, Pa.; Tuthill Pump Co., Chicago, Ill.

U. S. Electrical Tool Co., Cincinnati, Ohio; Universal Standard Sales Co., Detroit, Mich.; Goss & DeLeeuw Machine Co., New Britain, Conn.; Safety Emery Wheel Co., Springfield, Ohio; LaSalle Tool Co., Ottawa, Ill.; *Automotive Industries*, Philadelphia, Pa.

Power Transmission Group Creates an Advisory Board

In order that this new organization may more accurately know the problems and be in a better position to advise transmission users, it was decided at the April directors' meeting in Chicago, to create a "Board of Advisory Engineers" from among the leading industrial and operating engineers of the country. William Staniar, belting and transmission engineer for the Dupont Co., has been appointed chairman of this board.

The board of directors feels that in choosing Mr. Staniar as chairman they have selected a man who is an outstanding authority on the subject of mechanical power transmission. His mechanical experience began in 1900, after a course of special technical training. He has been with the du Pont Company for the past twenty-two years in various engineering capacities. During the World War Mr. Staniar was assistant chief draftsman of the entire designing force of the company which comprised some three hundred men. At the close of the war Mr. Staniar was put in charge of operating belting and transmission machinery. Mr. Staniar's system of plant belt standardization is in operation in all the large plants of the du Pont Co., and four of the largest of the General Motors Corporation.

The officers and directors of the association hope to secure on this board with Mr. Staniar, representative engineers connected with various industries of the country who are specifiers and users of mechanical transmission appurtenances. Robert W. Drake, elecctrical engineer, McCormack Works, International Harvester Co., Chicago, has consented to serve on this board.

The chief function of this board will be to assist in solving the problems that daily confront industry in the mechanical transmission of power—also to advise, when requested as to most economical and efficient tranmission layouts for new installations and the simplifying and modernizing of existing arrangements.

W. H. Fisher, of T. B. Wood's Sons Co., Chambersburg, Pa., president of the association, presented a report of work under way by the association.

Safety Conference in Chicago

Prominent safety men, representing all the railroads of the United States and Canada, assembled in Chicago on April 19 for the seventh annual meeting of the safety section of the American Railway Association.

At the meeting, over which Chairman Thomas H. Carrow, supervisor of safety for the Pennsylvania R.R. presided, a number of important matters were considered, including plans for an intensive campaign to be waged in an effort to bring about a reduction in grade crossing accidents. In addition to grade crossing safety, the convention also discussed methods of bringing about greater safety in railway operation.

The Business Barometer

This week's outlook in Commerce, Finance, Agriculture and Industry

By THEODORE H. PRICE
Editor, Commerce and Finance, New York

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ALTHOUGH we are accustomed to think and speak of Japan and China as the "Far East" they are to the West of the United States as well as to the East, and it is only about 5,250 miles across the Pacific from San Francisco to Yokohama, whereas the distance in the opposite direction would approximate 16,000 miles.

These figures are given that our comparative closeness to what is called the Orient may be more fully realized and the possible effect of what is now happening there may be more intelligently gauged.

In China, conditions appear to be growing more and more chaotic, but chaos is not a condition that can be permanent and the existing disorder is almost a guarantee that orderly government will soon be established through the intervention of the European powers if not by the Chinese themselves. This is, however, a generalization rather than a deduction from the news, which is almost unintelligible to the occidental reader.

But in Japan the situation cannot be so philosophically regarded, although it is more comprehensible. Some two weeks ago the embarrassment of a great Japanese trading company or firm was reported. It had commitments all over the world and its liabilities were estimated at 500,000,000 yen, or $250,000,000. The fear that an important Japanese bank might be involved accentuated the resulting distrust, and in an effort to avert a crisis the Imperial Ministry directed the Bank of Japan to come to the rescue. This is the government bank, and following instructions it had granted credits amounting to about 1,000,000,000 yen, or $500,000,000 when "the elder statesmen" directed that no further advances should be made. These elder statesmen, of whom only one or two survive, compose a small council that appears to have the power to veto orders issued by any other agency of the government, but the use of this power is generally followed by the resignation of the ministry or cabinet whose proposal is vetoed, and that seems to be what has happened in the present case.

The Emperor has appointed a new cabinet, but its financial authority is apparently delimited, and the inability of the banks to obtain further advances from the Bank of Japan has led to so many suspensions that the newly appointed finance minister ordered that all the banks in Japan should be closed during last Friday and Saturday, by way of preparing for a general moratorium of twenty days, to begin next Monday morning when "the Diet will be convened for the purpose of authorizing the Bank of Japan to issue notes and take other measures to stem the widespread bank suspensions and restore financial stability."

The result of all this is that confidence has been rudely shocked and there are many who fear that some repercussion of the blow will be felt here. It is pointed out that there was a somewhat similar though less acute crisis in Japan in April, 1920; that it proved to be the harbinger of the world wide depression which began to be felt in this country six months later and that our trade with Japan has now become so large that we can hardly fail to be affected by any development that threatens its curtailment. In 1925-26, for example, we imported goods worth $254,000,000 from Japan and shipped merchandise valued at $406,000,000 to that country.

A large share of our exports was represented by cotton, of which Japan now consumes over 2,500,000 bales a year, principally American, and a possible reduction in the consumption of that article would have implications that might be peculiarly significant when considered in connection with the recent advance in the cotton market. That advance is chiefly due to the rise in the rivers which drain the Mississippi Valley. Of these rivers the six most important traverse or border on counties which produced 2,256,000 bales of cotton last year. Not more than one-third of this production is grown on bottom lands that are likely to be flooded, and 700,000 bales is therefore a liberal estimate of the cotton that can be destroyed by the overflow.

Taken altogether it is becoming plainer that this is not to be an abnormally active year, but on the other hand there is nothing yet in sight to suggest any great contraction and the stock market continues blithesomely bouyant upon the theory that money will soon be cheaper.

This suggestion is frowned upon by many conservative bankers who see in it an encouragement of speculation at a price level that is already dangerous, and Charles E. Mitchell, president of the National City Bank, is outspoken in his disapproval of it. He is quoted as saying that "As far as basic conditions are concerned, I do not feel that any change in the Federal Reserve rate is either necessary or desirable. A reduction at this time might even be detrimental to the country."

The view thus expressed is undoubtedly sound, but of its acceptance there is doubt, for those who are long of stocks are intoxicated with the exuberance of their own optimism and they will only yield to the persuasive power of a decline in values that will exhaust their margins.

WHAT'S DOING IN INDUSTRY

APRIL closed with a slight flurry in sales of machinery and machine tools that helped bring the month's business up to a fairly satisfactory total. The second half of the month was better than the first half, and the current volume of inquiries promises a continuation of moderate business next month.

NEW ENGLAND reports an upward trend in sales, with automotive, railroad and some export business being placed. The New York market is fair, competition forcing intensive sales effort in many lines. Activity has increased in Buffalo, where business has been dormant for several weeks. Some good railroad business is helping the general industrial activity in Philadelphia.

IN DETROIT a definite improvement is noted and automobile manufacturers are beginning to seek new equipment. A slight recession in orders is reported from Cincinnati, but inquiries are good and the slump is regarded as only temporary. Buying in Milwaukee is conservative. Slight improvement in Cleveland brought April volume ahead of March.

TAKING general business conditions all together, it is becoming plainer that this is not to be an abnormally active year, but there is nothing in sight to suggest any great contraction in activity.

The Industrial Review

Weekly progress of the machinery and machine tool business

THE following reports, gathered from the various machinery and machine tool centers of the country, indicate the trend of business in these industries and what may be expected from the future:

BUFFALO

There is more activity in the Buffalo machine tool trade at the present time than has been the case at any time this year. The policy of hand-to-mouth buying, however, still prevails and sales are chiefly for single machines.

The electrical equipment field is in about the same status as the machine tool field, with April showing the most activity of the year. More optimism prevails concerning the future, it is apparent. The general opinion is that there will be a steady increase in business of the small order variety.

One dealer stated that beginning with last December, each month had shown a slight improvement over each preceding month, but that the months of this year were still running somewhat under the corresponding months of last year in volume.

The seasonal demand for contractors' equipment is heavy, but conditions are somewhat upset by some serious price cutting tendencies which have hitherto been practically unknown in the Buffalo district.

NEW YORK

April closed with a verdict of "fair" in the market for machinery and machine tools in this territory. The volume of sales earlier in the month was disappointing to many dealers, but some substantial orders were placed in the last half of the month which brought bookings up to a fair figure. The absence of buying by large users of shop equipment is the cause for any dullness in the present trend. Most business at this time is coming from repair shops, manufacturers of electrical supplies, hardware and contract machine shops.

The B. & O. Railroad, the Monongahela Ry. and the New York Rapid Transit Co. are mentioned as buyers of tools in the past week. Other roads are inactive. More than one order was received from manufacturers of airplanes and aircraft engines in this territory, where intense activity is to be noted. Lathes, jig borers, shapers, die sinkers and grinders are represented in current orders. A large steam hammer, a car-wheel borer and a planer were also ordered. Inquiries have fallen off somewhat and the consensus of opinion is that sources of new business must be sought out and built up if the volume of orders is to be increased.

PHILADELPHIA

Some orders for additional shop equipment, placed in Philadelphia by Western railroads, was one of the hopeful signs observed by the machinery and machine tool trade in this market during the last two weeks. The orders came from the St. Louis & San Francisco R.R., and from the Southern Pacific. Some inquiries were received from other carriers, all bearing some indications of early orders.

Buying by general industrialists was reported from leaders of the industry, and while the orders were not as plentiful, nor as large as had been hoped for, the tone of business from these sources seemed to indicate industry generally is on a substantial foundation.

The automotive trade is still regarded as uncertain by the dealers and producers having equipment for that branch of the business. Some small purchases have been noted during the last two weeks, but there appears to be little to indicate an early resumption of active buying.

Manufacturers dealing with industrial concerns report that business shows some improvement over a month ago, but it is not yet up to the volume for the corresponding period of last year.

MILWAUKEE

Expectations are that the April volume of bookings by makers of metal working equipment will be fully equal to, if not slightly in excess of, March sales. However, in comparison with a year ago, the month probably will show a decrease, which is due largely to the lack of a volume demand for machinery from automobile factories. The conservative attitude of users generally continues to restrict business, but a more hopeful situation, as reflected by increasing patronage of metal working shops, is expected to result in greater activity.

As a general rule, local capacity is sufficient to handle current business, and in but few instances is any effort being made to make plant extensions which would require any quantity of new machinery.

Dealers report a moderate degree of activity in used machinery. Heavy tools are difficult to move, however, the best call being for light equipment from the smaller jobbing machine shops. Used tool stocks are large, but sales are sufficient to keep them from increasing.

DETROIT

Last week in the machinery and machine tool field in the Detroit district is characterized by a very definite forward movement. Not only is there a great deal more optimism than there was two weeks ago, but there is much of a substantial nature upon which to base this feeling.

While several of the largest automobile plants are still marking time as far as production is concerned, there are two or three plants working to capacity. Chevrolet in Flint, and Hudson in Detroit, are among these. The industry seems satisfied with the sales being made.

One of the signs of improved conditions is the fact that tool shops which have hitherto been idle are now getting a great deal of business. Many orders have been placed for jigs and fixtures.

The new Erskine model is progressing and it seems likely that the car will go into heavy production. Other Studebaker models are increasing in general popularity as evidenced by their sales.

The new Pontiac plant is now well into production and except for a few minor adjustments the new organization is functioning smoothly and effectively. The LaSalle car is maintaining its popularity and the original plans for production are being carried out.

Many inquiries are reported for standard machine tools and equipment throughout the field. This is considered another indication of an excellent future. Only small orders have been placed thus far, with the exception of one very large order for presses from a leading automobile manufacturer who is said to be contemplating the purchase of other tools in large quantities.

CINCINNATI

The majority of machine tool manufacturers in the Cincinnati district report that the past week was rather dull, with a slight falling off in sales. While a small number report that they held their own during the week, none report a gain. Sales agents report that the market was rather sluggish, with a slight falling off in demand.

A good volume of inquiries came in during the week, but no lists are reported as having been received. Requests for information and quotations came from all sections of the country, the major part of the requirements being single tools and replacements, well diversified.

The week's bookings were almost altogether confined to orders for single tools and replacements. Few purchases made by railroads were confined to single tools, and the same was the case with concerns in the automotive industry.

Neither manufacturers nor selling agents regard the lull of the past week as a sign that a general and continued business recession is near at hand. Orders now on the books will keep production at its present level for some time, it is stated.

CLEVELAND

Machine tool business in the Cleveland territory is showing a tendency to improve. Sales showed a gain during the first two weeks of April. Most of the orders received were for small lots, the aggregate bookings, however, were large enough to constitute an increase over March.

Inquiries continue to be received in satisfactory number and the closing of several large and important orders are looked for in the near future. Two large boring mills and two lathes for Ohio concerns were the outstanding sales recorded.

Dullness of the market and keener competition is causing the local industry to concentrate more effort on all pending quotations.

NEW ENGLAND

Manufacturers of automobiles were buyers of machinery equipment in the New England territory during the past week, and they were also well represented in the volume of prospective business. Machinery bought by the automotive industry was judged to be largely of the replacement variety, although here and there indications of expansion requirements were in evidence. Special machinery builders report an abundance of business to be had, some of which has to be declined because of business already booked.

Railroads were well represented among buyers and prospective customers. Mid-Western railroads have been in the market in this section, their requirements being a variety of shop equipment.

Small tools are selling well. Export shipments of chucks and dies are reported to be expanding. Some of the employers of skilled mechanics report their working forces to be larger than at any time since the war.

Cramp's Shipyard Will Be Discontinued

Announcement that the William Cramp & Sons' Ship and Engine Building Co. of Philadelphia will discontinue its shipbuilding activities and confine its efforts in the future wholly to engine building, hydro-electric, foundry and other allied work, was made on April 16 by J. Harry Mull, president of the company. The abandonment of vessel construction comes after ninety-seven years of continuous work in that industry, during which time the Cramp company has gained a world-wide reputation. Failure of the American government, as well as other nations, to continue the construction of war vessels and the consequent letdown of shipbuilding, were the main causes which prompted the action.

"This decision is due to the general curtailment of the naval construction program and the continued depression in merchant shipbuilding," said a statement issued by Mr. Mull. "Throughout the period of depression the company has maintained its plant and organization and has preserved its habitual high standards of construction in the belief that the demand for naval and commercial vessels would revive and that prices obtainable for its work would improve.

LOSSES SUSTAINED

"Sufficient shipbuilding business does not appear to be in prospect to justify the continuance of the extended facilities of the shipyard. Work on contracts during the past two years, when the company was unable to secure additional shipbuilding contracts, has resulted in substantial losses.

"On the assumption that the plans for re-letting the cruiser could be promptly consummated, a reorganizing and financing plan has been perfected and agreed to which includes the underwriting of two and one-half million of bonds and which will enable the company to complete the other vessels now under construction and to satisfy all its outstanding commitments.

"The manufacturing operations of the company's important subsidiaries, the De Le Vergne Machine Co., I. P. Morris Corporation, Pelton Water Wheel Co., Federal Steel Foundry Co., Cramps Brass and Iron Foundry, and Cramps Engine Manufacturing Co., will be continued. These operations include the manufacture of Diesel engines, castings, and hydraulic and other machinery. The business of the subsidiary companies is in a sound and prosperous condition and is capable of considerable expansion.

"A portion of the shipyard properties will be utilized in the operation of the subsidiary companies, and other plans are in contemplation for the balance of the shipyard and its facilities."

The non-marine activities of the company were segregated last year in a holding company, known as the Cramp-Morris Industrials, Inc., said to be dominated by W. Averill Harriman, New York financier.

It is expected that all of the shipbuilding activities of Cramps will cease about July 1. The Delaware River will then be greatly in danger of losing its reputation as the "Clyde of America," which it gained during the World War because of shipbuilding activities along the stream. With the passing of Cramps as a shipyard, the Delaware River will continue to have the Bethlehem Shipbuilding Corporation at Wilmington, the Sun Shipbuilding Co., at Chester, and the American Brown-Boveri Corporation, at Camden, to uphold its tradition.

Aircraft Manufacturers Exhibit and Demonstrate at Washington Show

An aircraft show and demonstration will be held in Washington, D. C., from May 2 to 5, in honor of the air delegates to the First Inter-American Commercial Aeronautic Commission meeting, delegates to the Third Pan-American Commercial Conference and the fifteenth annual meeting of the United States Chamber of Commerce. The show, which commemorates the first anniversary of America's airway system already has an entry list of over seventy manufacturers of all types of aeronautical equipment, will be the greatest exposition of aircraft, airway equipment and accessories ever held in the United States and will include the first public demonstration of civil night flying in the history of American aeronautics.

The exhibit section is being organized by the Aeronautical Chamber of Commerce and the flying demonstrations are being arranged by the National Aeronautic Association. Joint show committee headquarters have been established at the National Aeronautical Association, 1623 H St., N.W., Washington, D. C.

During the week there will be held sessions of the commission and also those of the Third Pan-American Commercial Conference, representing twenty-one countries, including the United States. The United States Chamber of Commerce is also holding its fifteenth annual meeting at the same time. Joint sessions of the Aeronautic Commission, the Commercial Conference, and the U. S. Chamber of Commerce are scheduled.

The Army and Navy and Marine Corps are co-operating in the flying and have put at the service of the show committee the Army-Navy flying field at Bolling Field, its hangars and other facilities.

A list of the manufacturers of airplanes and airplane engines, who will stage exhibits, are listed here:

Airplanes: Advance Aircraft Co., Atlantic Aircraft Corporation, Boeing Airplane Co., Buhl Aircraft Corporation, Canadian Vickers, Ltd., Consolidated Aircraft Corporation, Fairchild Aviation Co., Johnson Airplane Supply Co., Keystone Aircraft Corporation, Loening Aeronautical Engineering Corporation, Glenn L. Martin Co., Ryan Airlines, Inc., Stinson Aircraft Corporation, Travel Air, Inc., Chance Vought Corporation.

Airplane Engines: Curtiss Aeroplane and Motor Corporation, Packard Motor Car Co., Pratt & Whitney, Wright Aeronautical Corporation.

Gridley Organizes New Company

Announcement of the completion of the organization of the Gridley Machine Co., at Hartford, Conn., was made last week. This company, incorporated in February, is engaged in the manufacture of automatic machinery. The incorporators are D. H. Montgomery, D. H. Parker and E. H. Wheeler. The shop is located at 54 Arch St., Hartford, in a building owned by the Taylor & Fenn Co.

Officers of the company are: George H. Gridley, president; D. H. Parker, vice-president and treasurer; D. H. Montgomery, secretary; E. H. Wheeler, assistant secretary and treasurer. These men are all former associates in the National Acme Co.

New Rolls-Royce Model in Production

The latest model Rolls-Royce automobile, called the "New Phantom," has been put in production at the works of Rolls-Royce of America, Inc., at East Springfield, Mass. It is said to give one-third more power than the old "Silver Ghost," or "40-50" model, and sells for $2,000 more. It represents the adaptation of a car brought out last year at the Derby, England, works to the left-drive and other requirements distinctive of American motoring. Engine improvements that give a more even flow of power and quicker acceleration, a six-brake system that gives a quick stop, easier handling and greater safety, and a new lubrication system with central control from the driver's seat and contacts with thirty-five points in the chassis are cited as outstanding improvements.

Maurice Olley, chief engineer at East Springfield, worked in conjunction with engineers from the English plant in perfecting the new American car. More than 75 per cent of the cars now in manufacture at East Springfield are said to be of the new design.

Auto Production Up

March production (factory sales) of motor vehicles in the United States, as reported to the Department of Commerce, was 386,721, of which 341,665 were passenger cars and 45,056 were trucks, as compared with 298,750 passenger cars and trucks in February and 422,728 in March, 1926. The totals heretofore published have been revised.

The report is based on figures received from 158 manufacturers in the United States for recent months, 53 making passenger cars and 123 making trucks (18 making both passenger cars and trucks). Data for earlier months include 93 additional manufacturers, now out of business, while March data for 24 small firms, mostly truck manufacturers, were not received in time for inclusion in this report. Figures for passenger cars include taxicabs and those for trucks include ambulances, funeral cars, fire apparatus, street sweepers and buses. Canadian figures are supplied by Dominion bureau.

Business Items

The Magnolia Metal Co., of Montreal, Canada, announces the removal of its main offices to 338-A St. James St.

The Air Reduction Co., Inc., of New York, has acquired the Interstate Oxygen Co., with plants at Wheeling, W. Va., at Steubenville, Ohio, and at Portsmouth, Ohio; also the Compressed Gas Manufacturing Co., of Huntington, W. Va.

The National Automatic Tool Co., of Richmond, Ind., will start selling direct in the Detroit territory on June 14 through offices in the General Motors Bldg. It will be represented by T. C. McDonald and G. W. Schepman.

The Ononadaga Tool and Die Corporation, recently organized at Ononadaga, N. Y., has purchased the business of the Universal Equipment and Supply Co., of Syracuse, N. Y. Harry T. Ditch is manager of the new corporation.

The Service Machine and Iron Works, Inc., was recently organized and incorporated at New Orleans, La., for the manufacture and distribution of machinery and other similar products. The incorporators include Herman R. Rahn, 8420 Nelson St., New Orleans, and R. M. Preis.

Announcement has been made to Southern dealers and contractors of the establishment of a new distributing point at Dallas, Tex., by the Chain Belt Co., of Milwaukee, Wis., manufacturer of mixing and paving machinery. The Texas distributor is the Lone Star Road Machinery Co., 2003 S. Akard St., Dallas.

The Ford Motor Co. has purchased the plant in Long Island City owned by the Durant interests and used recently as a unit in the automobile business of Durant and Star cars. This building, one of the largest industrial plants in the East, was built by Ford several years ago, and sold in 1920. The purchase price was said to be in the neighborhood of $3,000,000.

J. R. Shays, Jr., Inc., of 100 Greenwich St., New York, is now handling sales in the entire Eastern district for the American High Speed Chain Co., of Indianapolis, manufacturer of silent and roller chains. Mr. Shays is also the representative for the Foote Bros. Gear and Machine Works, of Chicago.

The I. E. Schilling Co., of Miami, Fla., distributors of building supplies and contractors' and road building machinery, announces the recent appointment of Chris Dorn as manager of the machinery department, succeeding J. W. Hess, resigned. Mr. Dorn was for some time sales manager for the Acme Road Machinery Co., of Frankfort, N. Y., whose line is now distributed in the Florida district by the Schilling firm.

The Reed-Prentice Corporation, of Worcester, Mass., has made agency arrangements with the following Pacific coast machinery dealers to handle its line of machine tools: Shaw-Palmer-Bakewell Co., Los Angeles; Flanagan Machinery Co., San Francisco; F. A. Daley Co., Portland, Ore. The following have been appointed Pacific coast agents for the Wolf portable link sawing machine: Show-Palmer-Bakewell Co., Los Angeles; A. L. Young Machinery Co., San Francisco; P. Shinnock & Co., Portland, Ore.

Personals

RALPH J. COOK has been appointed special representative for the United States Electrical Tool Co., of Cincinnati.

CHARLES W. SIMPSON, formerly European representative for the National Acme Co., is now manager of the company's plant at Windsor, Vt.

A. KASTELLO has been appointed by the Detroit Stoker Co. as district sales representative for its eastern Canada and Montreal, Quebec, territories with headquarters at 915 New Birks Bldg., Montreal.

JOHN J. MCNIVEN has joined the sales organization of the General Supply Co. of Canada, Ltd., at Montreal, and will follow up all business of the engineering department in the province of Quebec.

GEORGE L. BITTING has been appointed director of sales for the Bunting Brass and Bronze Co., of Toledo. He was recently associated with the Standard Welding Co., and with the Eaton Axle Co., of Cleveland.

R. H. CLORE has been appointed sales representative in the Cincinnati territory for the United States Electrical Tool Co., of Cincinnati. Mr. Clore was formerly with the National Carbon Co., of Cleveland.

G. GORDON GALE, general manager of the Gatineau Power Co., which controls the vast power developments of the International Paper Co. in the Gatineau district of Quebec, has been made vice-president of the company.

BLAKE C. HOOPER has been appointed manager of railroad sales for the Baker-Raulang Co., of Cleveland, manufacturer of electric tractors, trucks and cranes. Mr. Hooper was formerly secretary and treasurer of the Minnesota Supply Co., of St. Paul.

W. L. WALKER, who for a number of years has been identified with engineering industries in the Southeast, has been appointed manager of a new department recently established by the Womack Lime and Cement Co., of Atlanta, for the distribution of contractors' machinery in the Georgia territory.

DOUGLAS T. HAMILTON, advertising manager for the Fellows Gear Shaper Co., is representing the Springfield, Vt., Chamber of Commerce on the "Vermont Special" train which left Burlington, Vt., on April 18 for a ten-day tour of the Middle-West and eastern Canada, carrying exhibits from various parts of the state.

MAJOR CLARENCE YOUNG, chief of air regulations of the aeronautics branch of the Commerce Department, left Washington on April 8 for a tour of the country, via plane. While on this inspection trip, Major Young will confer with the inspectors of the aeronautics branch who are in the field, and also with civil officials throughout the country regarding airports.

ALBERT H. JONES, formerly general superintendent of manufacture at the Rochester, N. Y., division of the Yates-American Machine Co., of Beloit, Wis., has been transferred to the main works at Beloit as superintendent of manufacturing. Mr. Jones has been associated with the woodworking machinery industry for twenty-six years, and for twenty years was superintendent of the American Woodworking Machinery Co., at Rochester, now a Yates-American division.

ATHERTON CLARK of the export department of the Black & Decker Manufacturing Co., Towson, Md., is now on a year's trip through the following countries: Hawaiian Islands, Australia, New Zealand, Ceylon, India, Straits Settlement, Dutch East Indies, Siam, French Indo-China, Philippine Islands, China, Korea and Japan. Mr. Clark will visit every Black and Decker distributor in these countries, spending some time with them in educating their salesmen on the various tools of the Black & Decker line.

Obituaries

CHRISTOPHER J. MORGAN, for the past 16 years general superintendent of the Monessen plant of the Pittsburgh Steel Co., died on April 17. He was 58 years old.

WILLIAM GOODMAN, inventor and engineer, and vice-president of the Worthington Pump and Machinery Corporation, died on April 21 in New York. Mr. Goodman had been in charge of manufacturing and engineering for the Worthington company and was known for his development of the new two-cycle double acting Diesel engine, recently acquired by the United States Shipping Board, and the development of the feather valve air compressor.

Forthcoming Meetings

American Gear Manufacturers Association. Eleventh annual meeting, Hayes Hotel, Jackson, Mich., May 12 to 14. T. W. Owen, secretary, 2443 Prospect Ave., Cleveland, Ohio.

American Society for Steel Treating. Spring sectional meeting, Milwaukee, Wis., May 19 and 20. W. H. Eisenman, secretary, 4600 Prospect Ave., Cleveland, Ohio.

American Society of Mechanical Engineers. Semi-annual meeting, White Sulphur Springs, W. Va., May 23 to 26. C. E. Davies, secretary in charge of meetings, 29 West 39th St., New York.

Associated Machine Tool Dealers. Annual spring meeting at Granville, Ohio, May 25, 26 and 27. Tyler W. Carlisle, secretary, the Strong, Carlisle & Hammond Co., 1392 West Third St., Cleveland, Ohio.

National Foreign Trade Council. Fourteenth national foreign trade convention, Hotel Statler, Detroit, Mich., May 25, 26 and 27. O. K. Davis, secretary, India House, Hanover Square, New York.

Society of Industrial Engineers. Annual meeting, Hotel Stevens, Chicago, May 25, 26 and 27. George C. Dent, secretary, 608 S. Dearborn St., Chicago, Ill.

Society of Automotive Engineers. Summer meeting, French Lick Springs, Ind., May 25 to 28. C. E. Heywood, manager of meetings department, 29 W. 39th St., New York City.

American Foundrymen's Association. Annual convention, Edgewater Beach, Chicago, June 6 to 10. R. E. Kennedy, secretary, 909 W. California St., Urbana, Ill.

National Supply and Machinery Distributors' Association. Twenty-second annual convention with the **Southern Supply and Machinery Dealers' Association**, and the **American Supply and Machinery Manufacturers' Association**, on board the steamship *Noronic*. Boat leaves Detroit, Mich., June 13 and returns there June 17. George A. Fernley, secretary, 505 Arch St., Philadelphia.

Exposition of Engineering Developments. Under the auspices of the Association of Iron and Steel Electrical Engineers, in the Empire Bldg., Pittsburgh, June 13 to 18. John F. Kelly, general chairman, 705 Empire Bldg., Pittsburgh.

American Society for Testing Materials. Annual meeting at French Lick, Ind., June 20 to 24. C. L. Warwick, secretary, 1315 Spruce St., Philadelphia.

American Railway Tool Foremen's Association. Fifteenth annual meeting, Hotel Sherman, Chicago, Aug. 31, Sept. 1 and 2. G. G. Macina, secretary, 11,402 Calumet Ave., Chicago.

Machine Tool Exhibit. Seventh annual machine tool exhibition under the auspices of the New Haven Section of the American Society of Mechanical Engineers, the Department of Mechanical Engineering of Sheffield Scientific School, Yale University, and the Chamber of Commerce of New Haven: At the Mason Laboratory, Yale University, Sept. 6 to 9. Harry R. Westcott, chairman of the exhibit committee, 400 Temple St., New Haven, Conn.

American Society for Steel Treating. Ninth annual convention and national steel exposition, Detroit, week of Sept. 19. W. H. Eisenman, secretary, 4600 Prospect Ave., Cleveland.

Machine Tool Builders' Exposition. First annual machine tool exposition, conducted by the National Machine Tool Builders' Association, at the West Annex of the Public Auditorium, Cleveland, Ohio, Sept. 19 to 24. J. Wallace Carrel, vice-president and general manager, the Lodge & Shipley Machine Tool Co., Cincinnati, chairman of the exposition committee. Roberts Everett, manager of the exposition, 225 West 34th St., New York. Ernest F. DuBrul, general manager of the association, 826 Provident Bank Bldg., Cincinnati, Ohio.

The Weekly Price Guide

Rise and Fall of the Market

THE only price advance of the week, among the materials listed, occurred in blue-annealed steelsheets at mill; a rise of 5c. per 100 lb. Black and galvanized sheets declined as did zinc sheets, solder, genuine highest grade babbitt metal, and certain descriptions of scrap lead, brass and zinc. Foundry coke dropped 10c. per ton, despite the strike of soft-coal miners. Demand is better, this week, in c.-i. pipe, wire products and the principal hot-rolled steel materials. Black and galvanized steel sheets, strips and oil pipe are moving more slowly.

(All prices as of Apr. 22)

IRON AND STEEL

PIG IRON—Per gross ton, f.o.b.:

CINCINNATI	
No. 2 Southern	$22.19
Northern Basic	20.89
Southern Ohio No. 2	21.19
NEW YORK—Tidewater Delivery	
Southern No. 2 (silicon 2.25@2.75)	26.37
BIRMINGHAM	
No. 2 Foundry	18.50
PHILADELPHIA	
Eastern Pa., No. 2x (silicon 2.25@2.75)	22.76
Virginia No. 2	27 17
Basic	21.76
CHICAGO	
No. 2 Foundry local	21.00
No. 2 Foundry, Southern (silicon 2.25@2.75)	23.55
PITTSBURGH, including freight charge ($1.76) from Valley	
No. 2 Foundry	20.26
Basic	19.76
Bessemer	21.26

IRON MACHINERY CASTINGS—Cost in cents per lb. of 100 flywheels, 6-in. face x 24-in. dia., hub not cored, good quality gray iron, weight 275 lb.:

Detroit	4.00@4.50
Cleveland	5.00@5.25
Cincinnati	5.00@5.50
New York	5.25@5.50
Chicago	4.75@5.25

SHEETS—Quotations are in cents per pound in various cities from warehouse; also the mill base in large lots.

Blue Annealed	Pittsburgh Mill Base	Chicago	Cleveland	New York
No. 10	2.20@2.30	3.50	3.25	3.89
No. 12	2.25@2.35	3.55	3.30	3.94
No. 14	2.30@2.40	3.60	3.35	3.99
No. 16	2.40@2.50	3.70	3.45	4.09
Black				
Nos. 18 to 20	2.50@2.60	3.75	3.25	4.00
No. 22	2.65@2.75	3.90	3.40	4.15
No. 24	2.70@2.80	3.95	3.45	4.20
No. 26	2.80@2.90	4.05	3.55	4.30
No. 28	2.95@3.05	4.20	4.70	4.45
Galvanized				
No. 10	2.95@3.00	4.10	3.95	4.25
Nos. 12 to 14	3.05@3.10	4.20	4.05	4.35
No. 16	3.15@3.20	4.30	4.15	4.45
No. 18	3.30@3.35	4.45	4.30	4.60
No. 20	3.45@3.50	4.60	4.45	4.75
No. 22	3.50@3.55	4.65	4.50	4.80
No. 24	3.65@3.70	4.80	4.65	4.95
No. 26	3.85@3.90	5.05	4.90	5.20
No. 28	4.10@4.15	5.30	5.15	5.45

WELDED STEEL PIPE—Warehouse discounts are as follows:

	New York Black	New York Galv.	Cleveland Black	Cleveland Galv.	Chicago Black	Chicago Galv.
1 to 3 in. steel butt welded	53%	39%	55½%	43½%	54%	41%
2½ to 6 in. steel lap welded	48%	35%	53½%	40½%	51%	38%

Malleable fittings: Classes B and C, banded, from New York stock sell at list plus 4% less 5%. Cast iron, standard sizes, 36-5% off.

Size, Inches	List Price per Foot	Diameter in Inches — External	Internal	Thickness Inches
1	$0.17	1.315	1.049	.133
1¼	.23	1.66	1.38	.14
1½	.27½	1.9	1.61	.145
2	.37	2.375	2.067	.154
2½	.58½	2.875	2.469	.203
3	.76½	3.5	3.068	.216
3½	.92	4.0	3.548	.226
4	1.09	4.5	4.026	.237
4½	1.27	5.0	4.506	.247
5	1.48	5.563	5.047	.258
6	1.92	6.625	6.065	.28

SEAMLESS STEEL TUBING—Following net prices are for seamless mechanical tubing, cold drawn, round, .10 to .30 carbon, at warehouse in lots of less than 100 ft. or 100 lb.:

Thickness — Decimal	B.w.g. and Fractions	Outside Diameter in Inches ¼	⅜	½	⅝	1	1¼	1½
		Price per Foot						
.035"	20	$0.15	$0.16	$0.17	$0.18	$0.19	$0.21	$0.23
.049"	18	.17	.18	.19	.20	.21	.23	.25
.065"	16	.19	.20	.21	.22	.23	.25	.27
.083"	14	.20	.22	.23	.24	.25	.27	.29
.095"	13	.21	.23	.25	.26	.27	.29	.31
.109"	12	.22	.24	.26	.27	.28	.30	.32
.120" or .125"	11	.23	.25	.27	.28	.29	.31	.33
.134"	10	.24	.26	.28	.29	.30	.32	.34

MISCELLANEOUS—Warehouse prices in cents per pound in 100-lb. lots:

	New York	Cleveland	Chicago
Spring steel, light*	4.50		4.65
Spring steel, heavier	4.00		4.00
Coppered Bessemer rods (base)	6.05	6.00	6.20
Hoop steel	4.49	3.65	4.15
Cold rolled strip steel	6.25	6.35	6.25
Floor plates	5.25	5.30	5.00
Cold drawn shafting or screw	4.00	3.90	3.60
Cold drawn flats, squares	4.50	4.40	4.10
Structural shapes (base)	3.34	3.10	3.10
Soft steel bars (base)	3.24	3.00	3.00
Soft steel bar shapes (base)	3.24	3.00	3.00
Soft steel bands (base)	3.99	3.20	3.65
Tank plates (base)	3.34	3.20	3.10
Bar iron (2.75 at mill)	3.24	3.21	3.00
Drill rod (from list)	60%	55%	50%

Electric welding wire, New York. ⅜, 8.35c.; ¼, 7.85c.; ⅛ to ½, 7.35c. per lb. *Flat, ⅛@½-in. thick.

METALS

Current Prices in Cents Per Pound

Copper, electrolytic, up to carlots, New York			14.37½
Tin, pigs, 5-ton lots, New York			69.87½
Lead, pigs, up to carlots, E. St. Louis	6.72½	New York	7.62½
Zinc, slabs, up to carlots, E. St. Louis	6.35	New York	7.25

	New York	Cleveland	Chicago
Antimony, slabs, ton spot	17.00		15.00
Copper sheets, base	21.75	21.75	21.75
Copper wire, base	18.50	18.37½	18.50
Copper bars, base	21.37½	21.37½	21.37½
Copper tubing, base	23.75	23.25	23.75
Brass sheets, high, base	18.12½	18.12½	18.12½
Brass tubing, high, base	23.00	23.00	23.00
Brass rods, high, base	15.87½	15.87½	15.87½
Brass wire, high, base	18.62½	18.37½	18.62½

Shop Materials and Supplies

METALS—Continued

	New York	Cleveland	Chicago
Aluminium ingots, 98 to 99%, 1 to 15 ton lots	26.00	26@27	26.02
Zinc sheets (casks)	12.25	12 30	11 36
Solder (½ and ½), (case lots)	41.75	43.75	38½@42½

Babbitt metal, delivered, New York, cents per lb.:

Genuine, highest grade	86.00
Commercial genuine, intermediate grade	61.00
Anti-friction metal, general service	31.50
No. 4 babbitt (f.o.b.)	13.50

Nickel, f.o.b. refinery, cents per lb.:

Ingots	35.00	Electrolytic	39.00
Shot	36.00		

SPECIAL NICKEL AND ALLOYS—Price in cents per lb., f.o.b. Huntington, W. Va.:

Hot rolled nickel sheet (base)	52.00
Cold rolled nickel sheet (base)	60.00
Hot rolled rods, Grade "A" (base)	50.00
Cold drawn rods, Grade "A" (base)	58.00

Base price of Monel metal in cents per lb., f.o.b. Huntington, W. Va.:

Shot	32.00	Hot rolled rods (base)	35.00
Blocks	32.00	Cold drawn rods (base)	43.00
Cold rolled sheets (base)	50.00	Hot rolled sheets (base)	42.00

OLD METALS—Dealers' purchasing prices in cents per pound:

	New York	Cleveland	Chicago
Crucible heavy copper	11.50 @11.75	10.75	10.75 @11.25
Copper, heavy, and wire	10.75 @11.25	11.00	9.75@ 10.25
Copper, light, and bottoms	9 25 @ 9.75	9.50	8.75@ 9 25
Heavy lead	6 00 @ 6.25	6.25	6.00@ 6.50
Tea lead	4.50 @ 4.75	4.25	4.75@ 5.25
Brass, heavy, yellow	7.12½@ 7.37½	7.50	6.75@ 7.25
Brass, heavy, red	9.25 @ 9.50	9.50	9.00@ 9.50
Brass, light	5.50 @ 5.75	6.00	6.00@ 6.50
No. 1 yellow rod turnings	7.50 @ 8.00	7.50	7.00@ 7.50
Zinc	4.00 @ 4.25	4.00	3.25@ 3.75

TIN PLATES—Charcoal—Bright—Per box

		New York	Cleveland	Chicago
"AAA" Grade: IC,	14x20	$12.10	$11.95	$11.50
"A" Grade: IC,	14x20	9.70	9.90	9 50
Coke Plates—Primes—Per box 100-lb.,	14x20	6.45	6.10	7.00
Terne Plates—Small lots, 8-lb. Coating—Per box IC,	14x20	7.75@8.00	7.00	7.50

MISCELLANEOUS

	New York	Cleveland	Chicago
Cotton waste, white, per lb.	$0.10@0.13½	$0.16	$0 15@0.20
Cotton waste, colored, per lb.	.09@ .13	.12	.12@ .17
Wiping cloths, washed white, per lb	.17½	36.00 per M	.15
Sal soda, per lb	.02½	.02	.02½
Roll sulphur, per lb	.02½	.03½	.04
Linseed oil, raw, per 7½-lb. gal., 5 bbl. lots	.85½	.93	.83
Lard cutting oil, 25% lard, in 5 gal. cans, per gal.	.55	.50	.50
Machine oil, medium-bodied (55 gal. metal bbl.), per gal.	.33	.35	.29
Belting—Present discounts from list in fair quantities (½ doz. rolls).			
Leather—List price, 24c. per lin. ft per inch of width for single ply.			
Medium grade	40–5%	40–5%	40–5%
Heavy grade	30–10%	30–10%	30–10%
Rubber transmission, 6-in., 6 ply, $1.83 per lin. ft.			
First grade	50%	50–10%	50%
Second grade	50–10%	60–5%	50–10%

Comparative Warehouse Prices

New York	Unit	Current Price	Four Weeks Ago	One Year Ago
Soft steel bars	per lb	$0.0324	$0.0324	$0.0324
Cold drawn shafting	per lb	.04	.04	.04
Brass rods	per lb	.1587½	.1612½	.1662½
Solder (½ and ½)	per lb	.4175	.425	.4012½
Cotton waste, white	per lb	.10@13½	10@.13½	.13@.17½
Emery disks, cloth, No. 1, 6 in. dia.	per 100	3.10	3.10	3.55
Lard cutting oil	per gal	.55	.55	.55
Machine oil	per gal	.33	.33	35
Belting, leather, medium	off list	40–5%	40–5%	40–5%
Machine bolts, up to 1x30 in., full kegs.	off list	50%*	40%	40%

*New list April 1, 1927.

MISCELLANEOUS—Continued

	New York	Cleveland	Chicag
Abrasive materials—In sheets 9x11 in., No. 1 grade, per ream of 480 sheets:			
*Flint paper	$5.13	$4.95	$5.13
*Emery paper	10.71	9.15	10.71
*Emery cloth	27.84	27.85	27.84
Emery disks, 6 in. dia., No. 1 grade, per 100:			
Paper	1.29	1.27	1.32
Cloth	3.10	3.05	3.05
Fire clay, per 100 lb. bag		.75	75
Coke, prompt furnace, per net ton		Connellsville,	3.15@3.25
Coke, prompt foundry, per net ton		Connellsville,	4.00@4.50
White lead, dry or in oil,	100 lb. kegs	New York,	15.25
Red lead, dry,	100 lb. kegs	New York,	15.25
Red lead, in oil,	100 lb. kegs	New York,	16 75

*4½ reams and under.

SHOP SUPPLIES

Discounts from new list dated Apr. 1, 1927, applying on immediate deliveries from warehouse stocks in New York and vicinity:

	Broken Kegs or Cases	Full Kegs or Cases
Machine bolts, square heads and nuts:		
Up to ¾ x 6-in	50%	50–10%
Larger up to 1 x 30-in	45%	50%
1¼ and 1½ in. dia	30%	35%
Carriage bolts:		
Up to ½ x 6-in	50–10%	
Larger sizes	50%	
Coach and lag screws:		
Up to ½ x 6-in	50–10%	
Larger sizes	50%	
Tap bolts, hexagonal heads	45%	
Nuts:		
Hot pressed, square and hexagonal, blank or tapped	45%	50–10%
Cold punched, square and hexagonal, blank or tapped	45%	50–10%
Semi-finished, hexagonal, tapped, in packages	40%	
Case hardened, hexagonal, tapped, in packages	30%	
Washers: Deduct from list, per 100 lb	$1.50	$3.50
Rivets, button and cone head:		
Small, including ⅜-in. dia		50–10%
Large (base) per 100 lb	$6.50	$5.00

EXTRA per 100 lb. on rivets, for ¼-in. dia., 35c.; ⅜-in., 15c.; 1-in., 5c.; lengths 1-in. and shorter, 25c.; longer than 1-in. up to and including 1¼-in., 15c.; longer than 5-in., 25c.; standard countersunk head, 25c.

Machine Requirements and Industrial Construction

Equipment Wanted

Mass., Boston — C. Blankmeyer, 91 Brighton Ave. — miscellaneous tools and equipment for proposed 3 story repair and service garage. Estimated cost $70,000.

Mass., Brookline (Boston P. O.)—H. M. Rambach, 18 Tremont St., Boston—general equipment for proposed machine shop here.

Mass., Newton (Boston P. O.)—P. A. Murray & Co., 210 Washington St.—miscellaneous tools and equipment for proposed repair and service garage. Estimated cost $40,000.

Mich., Detroit—Dept. of Purchases & Supplies, 710 Marquette Bldg. J. E. Mills, Purch. Agt., will receive bids until May 2 for a power driven all-steel shear.

O., Cleveland—The Colonial Iron Works Co., 875-885 East 67th St.—300 ft. air compressor combination horizontal punch and beam straightener, one 50 ft. x 9½ in. span 5 ton and two 28 ft. x 9 in. span electric traveling cranes, etc.

Pa., Johnstown—Bd. of Education—woodworking machinery including three 13 in. lathes, one 15 in. vertical drill press, one shaper, one wet tool grinder, one hack saw and one emery wheel.

Tex., McAllen—C. M. Ludlow & Associates—machinery and equipment for proposed three new machine and repair shops. Total estimated cost $120,000.

Que., Montreal—Julien Poirier, 10792 Lejeunerse St.—complete equipment for blacksmith and wheelright shops.

Opportunities for Future Business

Calif., Los Angeles—The White Motor c/o H. R. Hadlow, Const. Engr., 842 East 79th St., Cleveland, O., awarded contract for the construction of a 2 story, 200 x 230 ft. sales and service station here. Estimated cost $350,000.

Calif., San Jose—Heilwig Iron Works, 67 Almaden Ave., will soon award contract for the construction of a 1 story machine shop on Vine St. Noted Apr. 7.

Conn., Bridgeport—E. A. Lambert, c/o Fletcher-Thompson Inc., 542 Fairfield Ave., Archt., is having plans prepared for the construction of a 1 and 2 story, 100 x 250 ft. garage. Estimated cost $150,000. Cadillac Co., 532 Fairfield Ave., lessee.

Conn., Hartford—White Motor Co., B. M. Holden, 750 Main St., is receiving bids for the construction of a sales and service station on Maple St. Estimated cost $200,000. Private plans. Noted Dec. 16.

Conn., New Haven—Tidewater O.1 Sales Corp., 11 Broadway, New York, N. Y., awarded contract for the construction of a garage, etc. on Forbes Ave. here. Estimated cost $60,000. Private plans.

Fla., Jacksonville—N. S. Wood, c/o C. B. Schoeffle, Archt., is having plans prepared for the construction of a 1 and 2 story, 75 x 250 ft. garage. Estimated cost $175,000. Downs Motor Co., 810 Hogan St., lessee.

Ga., Rome — Southern Railway System, Charlotte, S. C., had plans prepared for the construction of new machine shops, etc., here. Estimated cost $125,000. G. L. Sitton, Ch. Engr.

Ill., Evanston—National Biscuit Co., E. R. Tomlinson, Pres., 85 9th Ave., New York, N. Y., awarded contract for the construction of a 4 story addition to machine shop at Keeney St. and Custer Ave., here. Estimated cost $125,000.

Ind., Ft. Wayne—Fries Tool & Machine Works, is having plans prepared for a 1 story, 40 x 140 ft. factory. Estimated cost $50,000. G. Mahunin, Standard Bldg., Archt.

Ind., Indianapolis—R. J. Cossey, 2229 East New York St., awarded contract for the construction of a machine shop and service building. Estimated cost $40,000.

Kan., Chanute—Bd. of Education, L. H. Pettit, Clk., awarded contract for the construction of a 2 story, 100 x 150 ft., and 2 story, 56 x 87 ft. additions to senior and junior high schools including shops, etc. Estimated cost $198,000. Noted Apr. 7.

Mass., Lawrence — Emerson Mfg. Co., manufacturers of pulp and paper mill machinery, is receiving bids for the construction of a 1 story, 50 x 225 ft. factory on Market St. Ashton, Huntress & Alter, 477 Essex St., Archts.

Mass., Milford—Milford Electric Light Co., 241 Main St., awarded contract for the construction of a 2 story garage and repair shop. Estimated cost $40,000. Noted Mar. 31.

Mass., Salem—R. Rogers, 2 Holly St., is having sketches made for the construction of a 1 story repair and service garage on Canal St. Estimated cost $50,000. W. H. Hunt & Son, 197 Washington St., Archts.

Mass., Springfield—S. Z. Poli Realty Co., T. F. Nolan, Agt., 196 Worthington St., is receiving bids for the construction of a 6 story, 131 x 207 ft. garage, and terminal on Broadway. Estimated cost $1,000,000.

Mo., St. Louis—F. H. Fitch, Huntzinger Bldg., Kansas City, awarded contract for the construction of a 1 story, 130 x 132 ft. garage at Ninth and Walnut Sts. here.

Mo., St. Louis—Universal Automobile Service Co., c/o C. R. Felton, Pres., Missouri Theatre Bldg., awarded contract for the construction of a 6 story garage at Delmar St. and Grand Blvd. Estimated cost $700,000. Noted Apr. 14.

Mo., Springfield — St. Louis-San Francisco Ry., St. Louis, will build addition to round house at North Side shops, also addition to West Side coach shops, here. Estimated cost $100,000. F. G. Jonah, Ch. Engr.

N. H., Manchester—A. L. Gadboro, c/o New Hampshire Auto Co., 1631 Elm St., will build a 2 story, 60 x 100 ft. repair and service garage on Birch St. Estimated cost $50,000. J. N. Guertin, Beach St., Archt. Noted Mar. 31.

N. J., Irvington—E. Polter & Co., 1168 South Grove St., manufacturers of bag frames, is having plans prepared for the construction of a 2 story, 65 x 100 ft. factory. Estimated cost $40,000. W. E. Lehman, 972 Broad St., Newark, Archt.

N. J., Park Ridge—Mittagh & Volger, Park Ave., manufacturers of typewriter spools, had plans prepared for the construction of a 2 story factory. Estimated cost $75,000. W. E. Truesdell, 29 Mountain Ave., Summit, Archt.

N. Y., New York—White Motor Co., H. R. Hadlow, Const. Engr., 842 East 79th St., Cleveland, O., awarded contract for the construction of a 3 story 80,000 sq.ft. sales and service building at 133rd St. and Cypress Ave. here. Estimated cost $350,000. Noted Mar. 31.

N. Y., Pittsford — Commission of Highways, Albany, awarded contract for the construction of a workshop here. Estimated cost $37,700. Noted Apr. 21.

O., Canton—Superior Sheet Steel Co., Canton-Louisville Rd. awarded contract for the construction of a 50 x 150 ft. addition to factory on Louisville Rd. Estimated cost $50,000.

O., Cleveland—Bailey Meter Co., 2015 East 46th St., is having plans prepared for the construction of a 1 story addition to factory on Ivanhoe Rd. Estimated cost $40,000. Hadlow Hick & Co., Finance Bldg., Archts.

O., Columbus—R. W. Schiff, 108½ North Third St., awarded contract for the construction of a 1 story, 78 x 150 ft. repair and service garage at 3415 North High St. Estimated cost $36,000. Noted Mar. 3.

Pa., Philadelphia—Cadillac Co., Broad and Ridge Sts., awarded contract for the construction of an 8 story, 75 x 160 ft. sales and service station. Estimated cost $400,000.

Pa., Philadelphia—P. S. Tyre, 114 South 15th St., Archt., will receive bids until May 2, for the construction of a sales and service station at 1515 North Broad St. for R. H. and J. J. Greenberg, Morris Bldg. Harper & Harper, 720 North Broad St., lessee.

Pa., Pittsburgh—Exchange Land Co., 127 North Heland Ave., awarded contract for the construction of a 1 and 2 story, 60 x 196 and 70 x 100 ft. garage on West Liberty Ave. Estimated cost $150,000.

Pa., Pittsburgh — General Motors Corp., Highland Park, Mich., is having plans prepared for the construction of a 2 story assembly plant on Liberty Ave. Etimated cost $300,000. A. Kahn, 1000 Marquette Bldg., Detroit, Mich., Archt.

R. I., Pawtucket—Pawtucket Times, C. O. Block, Pres., awarded contract for the construction of a 1 and 2 story garage and repair shop on Mongomery St. Estimated cost $50,000. Noted Apr. 7.

R. I., Providence—The White Motor Co., H. R. Hadlow, Engr., 842 East 79th St., Cleveland, O., is having plans prepared for the construction of a 2 story sales and service station here. Estimated cost $150,000. Private plans.

S. C., Greenville—J. P. Thompson, 804 Augusta St., has work under way on the construction of a new foundry and machine shop. Estimated cost $20,000.

Tenn., Chattanooga—Century Co., W. E. Brook, Pres., is having plans prepared for the construction of a 1 story garage on Broad St. Estimated cost $150,000. C. E. Bearden, First National Bank Bldg., Archt. Chattanooga Cadillac Co., lessee. Noted Apr. 7.

Tenn., Memphis—J. & J. Canale, awarded contract for the construction of a 2 story sales and service building at South Front St. and Huling Ave. Estimated cost $150,000. Chevrolet Motor Co., lessee.

Tex., Houston—Neils Esperson Estate, Esperson Bldg., awarded contract for the construction of a 4 story, 52 x 100 ft. garage on Milam St. Estimated cost $125,000.

Tex., San Antonio—Smith Bros. Development Co., c/o Plaza Hotel, plans the construction of a garage. Estimated cost $75,000. A. B. & B. M. Ayres, Bedell Bldg., Archts.

Vt., White River Junction — Vermont Baking Co., 31 North St., is receiving bids for the construction of a 1 and 2 story garage and repair shop. Estimated cost $40,000. Wells & Hudson, Hanover, N. H., Archts.

Wis., De Pere—The De Pere Motor Co., plans the construction of a 2 story, 50 x 120 ft. repair shop and service station on George St. Estimated cost $40,000. Architect not selected.

Wis., Madison—The Hub Co., J. A. Markward, Mgr., 328 West Gordham St., awarded contract for the construction of a 1 story, 55 x 66 ft. repair shop and service station. Estimated cost $55,000.

Wis., Madison—Madison Garage Corp., c/o O. J. Kaltes, 1 West Main St., plans the construction of a garage. Estimated cost $150,000. Architect not selected.

Wis., Sheboygan — Schneiderwind & Zehms, 1401 Indiana Ave., is having plans prepared for a 2 story, 33 x 44 and 20 x 22 ft. shop and service station. Estimated cost $40,000. W. C. Weeks, 730 Antario Ave., Archt.